EXAMINING DRIVING RISK AND LIFESTYLE FACTORS INFLUENCING SPEED PREFERENCE IN A LABORATORY-BASED SPEED CHOICE TASK

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Abstract

Vehicle crashes are one of the leading causes of severe injury or death in the world, and are accompanied by tremendous social and financial burdens. Excessive or inappropriate speed plays a major role in increasing the likelihood that a crash will occur, as well as elevating the severity of injury or damage. Young drivers are disproportionately over-represented in speed related crash involvement, and determining the factors contributing to young driver crashes is an important consideration. Both age and gender stand out as playing important roles in drivers crash likelihood, with the probability of being involved in a crash being significantly elevated for drivers aged under 25 years old. Young drivers are also prone to over-confidence in their driving skills, and this 'poor calibration' has been found to be a factor in crash involvement. Also, lack of impulse control could be a major factor related to speeding behaviour. Young drivers may have still developing executive functions of the frontal lobes, which might explain these age related factors of unsafe driving.

One yet unexplored factor in determining the likelihood of crash involvement is the role of life satisfaction and well-being in driving behaviour. Low levels of life satisfaction have been found to be associated with risky, maladaptive, or disadvantageous behaviours. Given that younger people have high rates of depression and anxiety, this may implicate life satisfaction as an important and unexplored area of interest in driver psychology. In the current study, we looked to explore whether different levels of life satisfaction was related to the way drivers chose preferred speeds in a laboratory and video-based speed choice task. Additionally, measures of self-rated

driver skills, past driving violations, as well as probability of future risky driving behaviour were used in order to predict speed choices in young driver.

It was found that while there was significant difference between gender groups, with the unexpected finding of female drivers choosing faster speeds, the life-satisfaction measures were not found to be significant in predicting speed choices. However, it was indeed observed that drivers who were classified as low in life satisfaction tended to choose faster speeds, but this needs to be replicated with a larger sample to increase the power of the statistics, possibly revealing a significant effect. The thesis discusses limitations of the current research as well as suggestions for further research.

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Ethical Information

This research was conducted in accordance with University of Waikato Ethical Guidelines concerning human testing (Ethical Conduct in Human Research and Related Activities Regulations, 2008). Application for human testing was submitted to the University of Waikato, School of Psychology Ethics Committee and was approved on the 2 June 2015.

Participants were briefed concerning their rights as participants, and were informed about the experiment with opportunity to ask questions related to the research. Participants gave written consent before undergoing testing. Participants enrolled in first year psychology papers were given 2 percent course credit toward their final grade as a show of appreciation. Participants who requested a summary of research findings were emailed a short description of the study findings.

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1. Literature Review

1.1. Young Driver Problem

1.1.1. The Role Risk-Taking Plays

As we survey the landscape of human history, it becomes apparent that youth has always been characterized as a time of increased risk-taking. Youth has always been a developmental stage marked with increased risk-taking and sensation-seeking (Arnett, 1994, 2000; Dahl, 2004). Even in our modern developed societies, despite unprecedented access to increasing medical and technological advancements, young individuals experience a vast array of social, emotional, and physical harm as a result of taking risks and seeking out more thrilling situations. The severity of this harm varies from minor to life-threatening. As the cause of these personal injuries or deaths are often symptoms of risk-taking or impulsive decisions, most experts classify them as self-inflicted.

Although not all young people are guilty of excessive risk-taking, it is often individuals between the age of 15-25 years who engage in activities which put themselves and others around them at risk of harm. Often these activities are done to push beyond personal limits, or those limits established in societal norms, in order to experience the 'rush' or excitement that comes from doing something which is risky or thrilling. The types of risk-taking activities which young people often engage in include; binge drinking, unprotected sex with multiple partners, theft and vandalism, acts of violence, cigarette smoking, general drug-use, and dangerous driving (Igra and Irwin, 1996; Irwin 1992; Dryfoos, 1990).

Adults also often engage in the same potentially risky behaviours as young adults, but there are important differences between the two groups in terms of the consequences for their actions. The nature in which the average adult, for example, consumes alcohol differs from that of a young adult. The differences may be very subtle (the content and amount of alcohol may even be the same) but certain workings behind each groups' thinking during a night of alcohol consumption can be the difference between ending up in hospital and ending up with a mild hangover. An adult who has eventually tailored their risky behaviour to the point that they are experiencing minimal negative consequences would most likely have at some stage been an adolescent, eliciting similar behaviour but with potentially far worse implications (Spear, 2000; Steinberg, 2005, 2007). Everyone who makes it to adulthood goes through a transition from being a child to being an adult which often requires making mistakes, but it is through these mistakes that the individual can refine their behaviour and be less prone to harming themselves and others.

In order make the transition from childhood through adolescence to adulthood, there are various roles and responsibilities that individuals must take on. One very significant responsibility, which is frequently seen a rite of passage into adulthood, is learning to operate a vehicle. Driving has a plethora of practical uses that make owning and operating a car almost essential in modern everyday life, and in the context of adolescent social development marks a distinctive period of increased personal autonomy. When done so safely, driving can positively impact peoples' health and greatly minimize stress, as well as create opportunity for personal enjoyment and increased freedom of movement.

Driving can be however, extremely risky when performed recklessly or without proper appreciation of the dangers that come with being 'behind the wheel', and is the leading cause of death and injury worldwide for young persons aged between 15 and 25 years old. In fact, according to International Transport Forum (2013), the overall road death-toll worldwide is around 1.2 million persons a year, with young drivers representing a disproportionately high percentage of those killed or injured (MacDonald, 1994a; Senserrick, 2006). This figure is also echoed in a report from the renowned World Health Organization (2009) which also states that around 1.2 million road fatalities occur globally, with an additional estimate of 50 million people suffering injury resulting from traffic accidents on an annual basis. Justifiably, the World Health Organization has listed road or vehicle related deaths and injuries as one of the most serious health issues facing the world at present.

1.1.2. Disproportionate Representation of Adolescents in Traffic Fatalities

For many years, lack of driving skill acquisition was deemed to be the primary factor contributing to young drivers' over involvement in road incidents. A study by Clarke, Ward, and Truman (2005) evaluated a sample of 3437 accident reports involving 17-25-year-old drivers from 1994 through to 1996. Their analysis revealed that, contrary to the previously held belief that a deficient driver skill repertoire was the primary factor in crashes, risk taking behaviour underpinned the vast majority of vehicle crashes where a young driver was at fault.

According to Scott-Parker, Watson, and King (2009), young drivers are largely overrepresented in global crash statistics and are disproportionately at fault for traffic accidents which result in both injury and fatality. The NHTSA (2007) reported that, of the 41,000 fatalities and approximately three million injuries in the US in 2006, young drivers between the ages of 16-24 were involved in or at fault for 24 percent. The NHTSA (2015) reported that 2011 was the third year in a row which 16 to 25 year olds were identified as the leading cause of traffic accidents resulting in death.

In a report released by the OECD (2006), it was found that although drivers aged 15 to 24 years only made up 9-13 percent of the driving population within the 34 combined OECD nations, they were involved in 18 to 30 percent of fatal crashes. Macdonald (1994a) found that young drivers only made up 15 percent of the Australian driver population, but were responsible for 35 percent of fatal crashes and 50 percent of crashes which result in injury. In France in 2009, 18 to 24 year olds who made up 8.9 percent of the driving population accounted for approximately 20 percent traffic related injuries (Observatoire National Interministreriel de Securite Routiere, 2010). This makes the issue of young drivers one of particular concern, and places emphasis on the

continued need for further research and innovation in order to counter this increasingly severe trend.

1.1.3. Young Driver Problem in New Zealand

The trend observed internationally is also reflected in New Zealand, with young drivers being disproportionately represented in fatal or injurious crashes (MacDonald, 1994a). In terms of overall statistics, New Zealand has seen often seen a higher relative road traffic fatality rate than most other developed countries (Langley, Wangenar, and Begg, 1996).

A Report by the OECD identified New Zealand as having more road traffic related deaths per 100,000 (8.57) in 2008 than the majority of the other 30 developed countries involved in the analysis. Some of the countries that recorded fewer road traffic fatalities than New Zealand in 2008 (per 100,000) included; United Kingdom (4.31), Switzerland (4.70), Spain (6.85), Japan (4.72), Germany (5.45), France (6.91), and Australia (6.80). Out of the 30 countries involved in the 2008 OECD study, only four experienced a greater number of road casualties than New Zealand; these being the United States (12.25), Czech Republic (10.37), Greece (14.43), and Belgium (10.08). While there have been some slight overall differences between New Zealand and other developed countries, there appears to be very similar trends regarding young drivers being disproportionally responsible for road traffic accidents.

Ministry of Transport (2015) reported that young drivers aged 15 to 24 years are often deemed responsible for crashes in New Zealand. A report of New Zealand young

driver statistics revealed that in 2014 young drivers were at fault for 85 percent of crashes resulting in injury and 77 percent of fatal crashes.

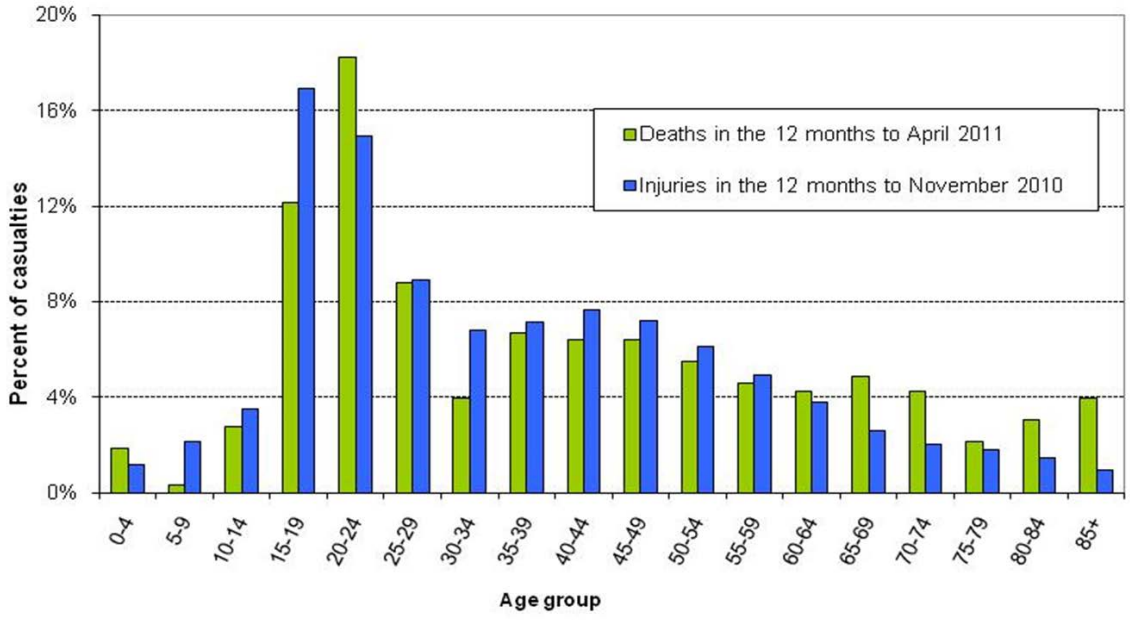

Figure 1.1: Drivers involved in fatal and injurious crashes over a 12-month period in New Zealand (Ministry of Transport, 2011)

It was also found that New Zealand drivers aged 15 to 19 years make up 4 percent of the overall licensed driver population but are responsible for 9 percent of crashes involving injury and 7 percent of crashes resulting in death. Also, drivers aged 20 to 24 make up 9 percent of all licensed drivers and contribute to 15 percent of crashes resulting in injury and 12 percent of those resulting in death.

It is noteworthy that either excessive or inappropriate speeding plays a significant role in almost half of all fatal crashes involving young drivers. Excessive speeding refers to speeds which exceed the legal road speed limit, whereas inappropriate speed refers to travelling at a speed that is not necessarily illegal, but is still not appropriate for the road

conditions (i.e. driving too fast on a wet road). In both situations, inappropriate or excessive speeding can result in loss of control (see Figure 1.2) of the vehicle, which accounts for over 40% of the fatalities among young drivers aged 15 to 24 years (Ministry of Transport, 2009).

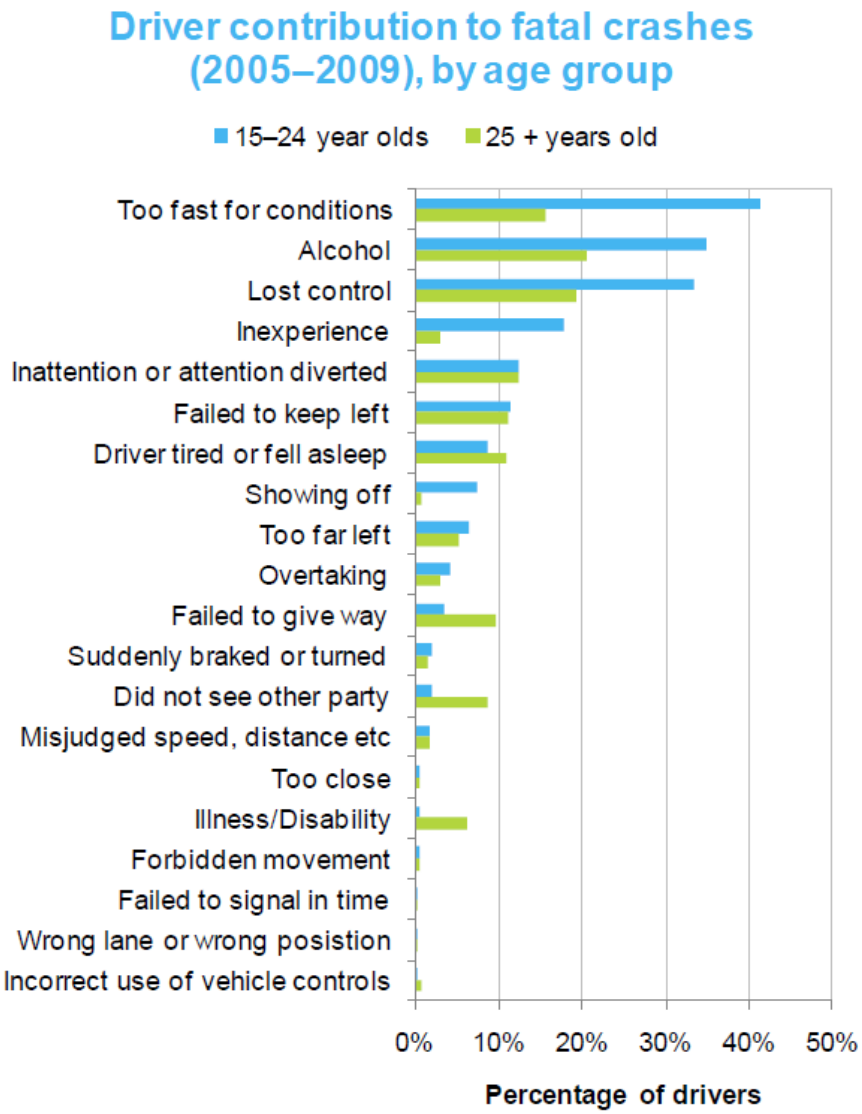

Figure 1.2: Figure shows the main causes of fatal crashes for two driver age groups. It is clear to see that loss of control and inappropriate speed are leading causes for loss of young lives (Ministry of Transport, 2010).

1.2. Hard-wired for Risk: social and biological factors in young drivers

1.2.1. Are males more likely to take risks?

It has been well established that younger inexperienced drivers are more likely than older more experienced drivers to engage in risky driving behaviour (MacDonald, 1994b). It is also widely understood that young male drivers are the most likely to crash or be the cause of a road accident. New Zealand Ministry of Transport (2015) found that, of the crashes which drivers aged 15 to 24 years were deemed responsible, 80 percent were involved a young male driver at fault. It was also found that in 2013/14 male drivers aged 15 to 19 were eight to nine times more likely to be responsible for a crash than males aged 55 to 59 years old.

Forsyth (1992) found that in the late 80's to early 90's there was a remarkable difference between young male and young female driving. It was found that younger males were not only more likely to speed, but they were more likely to ignore road signs and markings, and were far more likely to drive under the influence of alcohol. According to Mayhew, Ferguson, Desmond, and Simpson (2003) these differences are still present in more modern times but there is not as great of a difference between males and females in regards to alcohol related driving offences. Furthermore, the number of female drivers found driving whilst intoxicated has increased, despite reductions in male arrest rates and female declines in almost all other arrest categories (Schwartz and Steffensmeier, 2007).

Despite young male drivers being generally over-represented in crashes in crash statistics, researchers have occasionally found contradictory findings. For instance, Fildes, Rumbold, and Leening (1991), and Harrison, Fitzgerald, Pronk, and Fildes (1998) both conducted independent unobtrusive observational studies of drivers, and reported that

male drivers were not significantly more likely than female drivers to be observed travelling at higher speeds on either rural or urban roads. However, these studies did not take into consideration the age of the driver, which could have potentially exposed a significant gender effect.

When crash data was analyzed, Diamantopoulou, Hoareau, Oxley and Cameron (2003) found that gender was a significant predictor of crashes involving speed, with male drivers being involved in crashes occurring at significantly higher speeds than female drivers. Complimenting these findings, in an analysis of excessive speeding offence data for Western Australia collected between 1996 and 1998, Rosman (2000) found that police enforcement activity for this period detected fewer speeding female drivers (6.7%) than male drivers (13.5%). Rosman (2000) found that male drivers aged 17-19 years old had the highest rates of offence (over a third of offences) of all drivers for this period, and were also more than three times as likely than female drivers to be repeat offenders with male drivers aged 17-19 years most likely to be repeat speeding offenders.

There are many different ways to explain why young males are so much more at risk of traffic offences than any other group. Hopkins (1990) put forth the suggestion that young male driving was influenced by social pressures regarding identity and ideas of masculinity. Many males would identify certain aspects of masculinity such as speed, fearlessness, risk taking, rebellion, and competition with driving and in turn align these characteristics with their own driving behaviour. Young males are often portrayed in popular television and film roles (e.g. Fast and Furious) as fast and reckless (albeit competent) drivers, which further reinforces the stereotype that masculinity is associated with the ability to control a vehicle at excessive speeds.

A study conducted by Mast, Sieverding, Esslen, Graber, and Jancke (2008) put this theory to the test. A sample of 83 males were separated into three groups; masculine, feminine, and neutral. The masculine group were placed in a driving simulator and made to listen to what was defined as masculine radio content during a driving task. The feminine group were given the same task paired with feminine radio content while the neutral group did not listen to the radio. The results showed that the masculine group drove at significantly faster speeds than the feminine and the neutral groups.

1.3. Attitudes and Beliefs and dangerous driving

In summary of the reviewed literature, these findings suggest that there is a strong psycho-social association between masculine ideals, and driving a vehicle at high speed, and this may be particularly exaggerated during adolescence. For example, Parker and colleagues (1995) suggest that deliberate violations account for more accident involvement than errors or lapses, and McKnight and Resnick (1993) have suggested that young drivers tend to engage in risks which have little to do with driving skill or ability, but rather individual motivations such as sensation or thrill-seeking, and are overconfident in their ability to control a vehicle under risky conditions (Brown, 1982). One illustration of this is that drivers who are over-confident in their ability to control a vehicle tend not to view exceeding speed limits to be dangerous, as they believe they would be able to avoid being involved in a crash should they momentarily lose control (Corbett, 2001).

Attitudes and beliefs do seem to play an important role in drivers' behaviour, and research has revealed a number of behavioural, personality characteristics, attitudes, beliefs, and social factors contribute towards the involvement of younger drivers involved in crashes (Assun, 1997; Iversen and Rundmo, 2002; Ulleberg and Rundmo, 2003). Personality characteristics such as impulsivity, over-confidence (poor calibration), sensation seeking, aggression, and lack of conscientiousness have been observed to be relatively common traits amongst crash-prone and risky drivers (Gregerson and Berg, 1994; Deffenbacher, Lynch, Deffenbacher, and Oetting 2001).

1.3.1. Social and cultural development during adolescence: attitudes and beliefs

Among young drivers, males are found to be more at risk of traffic violations, lapses in concentration, and risk taking behaviour resulting in crashes (Rajanlin, 1994; Campbell and Stradling, 2003; Deery, 1999). Researchers have attempted to determine what it is about males that makes them more likely than female drivers to become at fault for a road traffic accident. As research has been conducted on this issue, the scope of investigation has been continually widened, bringing about more and more questions.

Despite being at a stage of increasing physical health and robustness, individuals moving from childhood to adolescence become increasingly more at risk of injury and death. This is not usually due to disease or sickness but more as a result of deliberate risk taking behaviour which puts them and their peers in danger. There are a number of different factors believed to be underlying this change in behaviour ranging from cognitive changes to social influence (Spear, 2001; Steinberg, 2005). The social element of risk-taking is something that has been documented for centuries. As social beings, humans are neurologically hard-wired to base our behaviour around the social dynamics of a given situation, and young people appear to succumb more heavily to this social influence (Dahl, 2004). Young drivers are often to found to speed and perform dangerous and reckless manoeuvres in order to impress their peers (Senserrick, 2006).

Young males have often been found to associate masculinity with fast and risky driving. Vehicles themselves are often seen as highly representative of the driver among some young drivers. Certain models and modifications are believed to be favourable over others with the speed at which a vehicle is capable being the biggest factor. Overall, these social dynamics are highly embedded in New Zealand's youth driving culture and are a large contributor to New Zealand crash statistics. Drivers (mostly young males)

immersed in this culture are known colloquially as Boy Racers and engage in a large amount of organized and spontaneous illegal driving which is viewed by many as a way of life.

Most importantly, young people have a number of cognitive factors underlying their propensity to take risks and make poor decisions (Spear, 2001; Keating, 2007; Steinberg, 2007). As a person transitions from childhood to adolescence, they undergo numerous neurological changes. Most significantly, adolescents undergo changes in their dopaminergic system which affects the way they make long term versus short term decisions (Steinberg, 2005, 2007), and are often inclined to base their decisions on what will provide them with more immediate and pleasurable rewards (see Reyna and Farley, 2006). By the time individuals mature, they tend to be more able to control their behaviour by weighing up long term consequences against short term gains. This is not to suggest that older and more mature people are not confronted with the temptation of immediate rewards, but suggesting that, provided their brains have fully developed, they are more able to control themselves as their cognitive-appraisal system has matured (Reyna and Farley, 2006).

1.3.2. Does life satisfaction influence driving behaviour?

Historically, as the issue of maladaptive driving behaviour has been explored, social psychological approaches have also become increasingly utilised, viewing the driver as a social entity with beliefs, attitudes, and personality factors which determine, or are related to their behaviour as drivers. Much of the early driving research focused on the acquisition of skill and experience, however, as models have become more sophisticated,

the role of vehicle manoeuvring has taken less prominent role (McKenna, Alexander, and Horswill, 2006).

Näätänen and Summala (1974) proposed that the adequate acquisition of psychomotor skills related to driving are not sufficient for safe driving performance. Rothengatter (1997) has pointed out the importance of not purely relying on performance factors such as on vehicle skill or management, but also the motivational and attitudinal factors of the driver as predictors of crash involvement. One example of this is the use of a five-factor model of personality to predict dangerous patterns of driving behaviour. The 'Big Five' are broad personality measures of extraversion, agreeableness, conscientiousness, openness to experience, and neuroticism (McCrae and Costa, 1987, 2008).

The use of these personality factors to predict unsafe driving has shown some significant findings, demonstrating the personality plays an important role in driver development. For instance, Clarke and Robertson (2008) found that both neuroticism and extraversion were associated with increased accident involvement. Reduced agreeableness and conscientiousness, and increased neuroticism and extroversion have all been found to be predictive of increased road rage and more aggressive driving behaviour (Britt and Garrity, 2006; Dahlen, Martin, Ragan, and Kuhlman, 2005). Low conscientiousness has also been found to be associated with risky driving behaviour in university students (Schwebel, Severson, Ball, and Rizzo, 2006). In an evaluative study of the British National Driver Improvement Initiative, Conner and Lai (2005) found that riskier and more lenient attitudes towards unsafe driving were related to more self-reported traffic violations, higher levels of sensation-seeking, and observed unsafe driving behaviours such as speeding. Lenient attitudes towards risky driving behaviours

have been demonstrated to be predictive of self-reported involvement in vehicle crashes, as well as the deliberate intention to speed (Parker and Manstead, 1996)

When investigating how personality factors relate to driving behaviour, what emerges from the literature is that dangerous or risky behaviour is not solely limited to driving, but composes a much broader cluster of generally risky behaviours that increase in occurrence during adolescence (Beirness and Simpson, 1988). Beirness and Simpson (1988) also found that self-reported frequent consumption of alcohol and problems with alcohol were significantly associated with higher self-reported deliberate risky driving (eg, speeding, drink-driving, close following). This may explain why speed and alcohol are often reported as co-contributing factors in crashes involving young drivers (Williams, Kyrychenko, and Retting, 2006).

Risky driving behaviour by young drivers is just one dimension of this much broader 'lifestyle of risk-taking' (Jessor, Turbin, Costa, Dong, Zhang, and Wang, 2003), and as Tilman and Hobbs (1949) observed "we drive as we live" (pp. 331). The use of self-reported historical behaviours as predictive of future behaviour has been the cornerstone of a number of theories of adolescent risk taking, such as Problem Behaviour Theory, and the Theory of Planned Behaviour (Jessor, 1987; Ajzen, 1991; Jessor, Van Der Bos, Vanderryn, Costa, and Turbin, 1995) which unite attitudes and beliefs that help perpetuate the survival of maladaptive behaviours.

More recently, social and organisational psychology has promoted an approach to driver research which integrates life satisfaction into the model of driver behaviour. A growing abundance of research is confirming that individuals who cultivate a meaningful sense of purpose for themselves tend to live longer lives, experience in general better physical and mental health, and lead more satisfying and happier lives than those who

experience a lack of purpose (Diener, Fujita, Tay, and Biswas Diener, 2012; Kim, Sun, Kubzansky, Park, and Peterson, 2013).

As an individual matures neurologically, there are significant changes in the neurological configuration of the prefrontal and limbic circuitry, typically resulting in improved impulse control, gratification delay, and emotional regulation (Dahl, 2004). As researchers have observed, happiness and life satisfaction have been found to be strongly predicted by emotional stability (DeNeve and Cooper, 1998; Hills and Acgyle, 2001).

Adolescence is a period of life recognised as being central in the development of personal identity and sense of life purpose (Bronk, 2011), and so promoting greater sense of personal meaning for adolescents may prove to be of immense value when addressing the young driver problem. Recent research, for example, indicates that teenagers who score higher on measures of purpose engage in safer driving behaviours (Taubman Ben-Ari, 2014), report greater life and student satisfaction and more positive moods in daily life (Burrow and Hill, 2011).

In 2014, a study by Orit Taubman Ben-Ari (2014) considered how factors associated with meaning, life satisfaction, and social bonding within a family context were related to the driving practices of behaviour of younger drivers, aged from between 17 and 21 years of age. Taubman Ben-Ari found that there was a significant correlation relationship was found between the endorsement of those with safer driving practices and having a higher meaning in life, better family communication, and a positive family climate in regard to safety (Taubman Ben-Ari, 2014).

This relationship between meaning and safer driving behaviour was observed in another study by Taubman Ben-Ari (2012), where young drivers were less likely than a

neutral control to consider engaging in reckless driving when asked to contemplate the significance of life and the feelings attached to living a meaningful life. These two studies taken together suggest that there could be an important relationship between self-perceived meaning and life satisfaction and the likelihood of engaging in dangerous driving behaviour.

Life satisfaction has been also found to be closely associated with job and student satisfaction (Proctor, Linley, and Maltby, 2009). It may be reasonable to assume that there is a degree of cross-transference between the general traits of life satisfaction, and ones wellbeing, engagement, and enjoyment in vocation or study. Conversely, a finding of reduced student or vocational satisfaction may be related to reduced overall life-satisfaction, and this may be associated with a greater disposition toward risky behaviours and maladaptive lifestyle choices. In two separate studies of student satisfaction by Valois and colleagues (2001, 2006) it was found that students with low life satisfaction were more prone to have demonstrated risky behaviours, including physical fighting and aggression, carrying a weapon at school, having stolen or damaged property, and driving a vehicle while under the influence of drugs or alcohol (Valois, Paxton, Zullig, and Huebner, 2001; 2006).

In further illustrating this point, Argyle and Lu (1990) found that life satisfaction was negatively correlated with personality traits of neuroticism and extraversion. Neuroticism and extraversion have both been found to be present in the personality make-up of drivers who are prone to engage in risky driving and road rage, and so one might infer a connection between reduced life-satisfaction and increased risky driving or road rage. Furthermore, Rigby and Huebner (2005) demonstrated that adaptive attribution for good outcomes served to partially mediate the relationship between

emotional stability and life satisfaction. This could imply that adolescents who possess higher emotional stability were more likely to make adaptive attributions for good outcomes, which in turn related to increased life-satisfaction, whereas those adolescents with emotional volatility were less inclined to make decisions which improved their overall life satisfaction (Rigby and Huebner, 2005)

Emotional stability is also related to job satisfaction (Judge and Bono, 2001; Judge, Heller, and Mount, 2002), and this relationship has been reinforced through findings of reciprocal relationships between job and life satisfaction (Judge and Wantanabe, 1993). It would seem logical to presume that there would be a natural relationship between life and job satisfaction, given that a person's work composes a substantial proportion of daily life (Judge and Wantanabe, 1993). For many adolescents, having a satisfying job might well be considered synonymous with having a satisfying experience as a student. As Judge and Locke found in their 1993 study, there is a significant relationship between subjective ratings of wellbeing and both measures of job and student satisfaction (Judge and Locke, 1993)

1.3.3. Impulsivity and driving behaviour

Research into drivers' behaviour and attitudes has determined a number of personal traits which have been found to commonly associate with high rates of crashes (Ulleberg and Rundmo, 2003). Personality traits that are commonly identified in young risk-prone drivers are a tendency toward being over-confident, high levels of sensation seeking, aggression, and indifference to being involved in a crash (Gregerson and Berg, 1994; Deffenbacher, Lynch, Deffenbacher, and Oetting 2001). Of these traits, many researchers

have identified impulsivity as being the most significant contributor to poor decision making amongst drivers (Mayer and Treat, 1977; Cherpitel and Tam, 2000). Although there has often been disagreement regarding its exact definition, impulsivity is widely known to be related to an array of maladaptive behaviours (Patton, Stanford, and Barratt, 1995; Bicakiz and Ozkan, 2016).

The vast majority people in society understand impulsivity to be a term that encompasses undesirable characteristics such as impatience and carelessness which underpin and individual's overall decision making. In the context of driving, the slightest misjudgement can lead to catastrophe. Abrupt and reckless decision making is the last thing that is needed as sudden and unstructured thinking can quickly result in a crash (Bicakiz and Ozkan, 2016).

Research surrounding the effect of impulse control on driving safety has produced overwhelming evidence which suggests individuals who are impulsive are far more likely to commit various traffic offences that their less impulsive counterparts (Patton, Stanford, and Barratt, 1995; Cherpitel and Tam, 2000). In a study by DePascale, Geller, Clarke, and Littleton (2001) which included data collected from 96 US College students found a significant correlation between impulsiveness and anger whilst driving.

Another study conducted by Chamorro, Bernardi, Potenza, Grant, Marsh, and Wang (2012) collected face-to-face survey data from 34,653 US civilians and found that individuals who were determined to be impulsive were significantly more likely to be reckless drivers. Additionally, a study by Eensoo, Paaver, and Harro (2011) included data gathered from 1,600 students of driving schools who were, at time of data collection, attempting to obtain their driver license. Participants were separated into groups based on their experiences with drunk driving according to records from police database. The

drunk driver group produced higher scores for impulsivity than the non-drunk driver group.

A similar finding can be seen in a study by McCarthy, Niculete, Treloar, Morris, and Bartholow (2012) which separated 29 University students into two groups based on their experiences with drink driving. The results showed a significant difference between the two groups suggesting that the drink driver group showed higher levels of negative urgency whilst driving.

1.3.4. Does past driving behaviour predict future crashes?

Mark Twain (1835 - 1910) is famously quoted in saying "…The best predictor of future behaviour is past behaviour…" and psychologists engaged in the study of human behaviour tend to agree that past behaviour is a useful marker for future behaviour, assuming that the predictions cover short time intervals and the individuals behavioural patterns are relatively consistent (as observed by the behaviourist B.F. Skinner, 1953).

Driver history, particularly a history of dangerous or risky driving, has provided a commonly used predictive measure of the likelihood that the same driver will be involved in an accident in the future. For example, following a comprehensive review of traffic statistics and police crash reports, researchers uncovered a strong relationship between the likelihood of being involved in a crash in the future, and having been charged with speeding related offences in the past (Janke, Masten, McKenzie, Gebers, and Kelsey, 2003). Rajanlin (1994) found a similar effect in his study of the link between traffic offences and later fatal crashes, demonstrating that drivers involved in fatal crashes often has a trail of preceding traffic infringements, particularly speeding related offenses.

McKenna and Horswill (2006) used this concern over being involved in a future accident as a predictor of speed choice, and found that a disregard for future crash likelihood coupled with higher self-rated driving skill (over-confidence) and sensation-seeking were strongly related to faster speed choice. Although Armitage and Conner (2001) have criticised the use of psycho-social measures by suggesting that introducing additional mediating variables is problematic, and that past behaviour has been shown to independently predict future driving behaviour due to its habitual nature (Armitage and Conner, 2001; Quellette and Wood, 1998), numerous studies have demonstrated the use of attitudinal measures along with historical behavioural measures provides a useful means of predicting future driving behaviour (Fredricks and Dossett, 1983; Ajzen, 1991), especially given that often researchers are forced to rely on self-reported behaviour and that exposure or involvement in crashes is relatively infrequent occurrence (Horswill and McKenna, 2006).

Supporting these findings, research by Parker et al., (1992) has provided empirical support for the idea that past speeding behaviour, combined with risky attitudes and perceptions of control are positively associated with the intention to speed in the future (Parker, Manstead, Stradling, Reason, and Baxter, 1992). In a following study, Parker, West, Stradling and Manstead (1995) examined the relationship between driving behaviour and accident involvement using the Manchester Driver Behaviour Questionnaire (developed by Reason, Manstead, Stradling, Baxter and Campbell, 1990) across a sample of 1656 drivers.

In the development and validation of the *Driver Behaviour Questionnaire*, Reason et al. (1990) identified three main types of dangerous driving behaviour, which they described as lapses, errors, and deliberate violations. Lapses occur when a driver fails or

omits to perform a particular driving action due to a failure in attention or memory. Errors occur when a driver initiates a faulty plan or action believing it to be correct when it is actually incorrect. Violations are deviations from the norms and rules that govern vehicle use. What marks violations different to lapses or errors is that they are deliberate planned decisions to 'break the rules' or deviate from correct or from safe driving practices.

Parker, Reason, Manstead and Stradling (1995) found that these deliberate violations correlate with both past and future accident rates, whereas self-reported tendency to make errors or to have lapses did not predict accident involvement. What is noteworthy from their study is that violations were found to be a statistically significant predictor of crash involvement even after the effects of driving distance, age and gender had been controlled for. This puts forward a strong case for the use of historical driver behaviour measures in researching driving behaviour, as well as measures of the intention to deliberately violate road-rules in the future. Additionally, the finding that deliberate and intentional driver violations are so strongly linked with accident involvement suggests that policy makers and driver educators should focus more on changing attitudes and beliefs around safe driving behaviour, rather than focus on the acquisition of basic driver competencies and skills.

1.3.5. The adolescent brain, risk, and life satisfaction

There are many well-known reasons as to why young people take risks or fail to make the correct decisions while driving but there remains uncertainty as to exactly how much of this issue is purely due to age (in terms of physical development) or driving experience. The ordeal poses a bit of a 'chicken or the egg' scenario forcing researchers and policy

makers to question the effect that both age and driving experience have on driving efficacy. While there are many practical benefits of young people becoming independent drivers who can manage their own lives, there is also a significant risk that they may not yet be ready. Developed countries around the world have attempted to implement programs which qualify young drivers to become more and more independent, and in doing so the correct balance between age and experience needs to be found. In order for this balance to be identified there needs to be clarity around the effect that both age and experience have on driving ability and safety.

It is clear to see that age and experience each play a crucial role in road accident statistics. The exact extent to which either age or experience has contributed to a given road-related incident cannot easily be explained as the two variables are so closely intertwined with one another (Mccartt, Mayhew, Braitman, Ferguson, and Simpson, 2009). Young drivers are naturally more likely to be reckless, immature, and succumb to peer pressure. These qualities can be very detrimental to an individual's driving ability and decision making. As stated above, there are numerous factors involved in physical development which influence peoples' driving behaviour. As people develop (mainly cognitively) with age they become less susceptible to such risk-taking and social influence. At the same time, people are often likely to be more reckless than usual when engaging in new activities once they feel like they have grasped the core skills. There is a common understanding that people tend to perform poorly in any task that they have no experience with. The tendency for people to lack skill without experience with which to acquire skill is something that is not necessarily related to age. Once an individual is physically developed enough to perform whatever motor skills are required of them, the task performance is far more heavily reliant on experience than age. This is what is believed to be what offsets the age effect. This occurrence is deemed to be the main

reason why, regardless of age, the lack of experience in any task will most likely cause people to underperform (Levy, 1990).

Mayhew, Simpson, and Pak (2003) sought to investigate the effect age had on driving by separating age and experience. The researchers attempted this separation by observing crash rates of drivers who had little to no driving experience (Novice Drivers) and also differed in age. The Novice Drivers were put into two groups; Young Novice (16 years – 19 years old), and Advanced Novice (20 years and older). The results showed that the Young Novice Drivers experienced a significantly higher number of crashes despite having the same amount of experience as the Advanced Novice Driver group. This same age effect was highlighted in a study by Lewis-Evans (2010) also separated age and experience as confounding variables in order to measure the effect age has on driving. The researchers examined participants who had held the same license for the same period of time but differed in age. The results showed that younger drivers had a remarkably higher likelihood of being involved in a vehicle crash.

There have been many studies which have clearly outlined the importance of driver experience in improving driver performance. Ahopalo (1987) conducted a study involving a group of young drivers who undertook a hazard perception task. The results showed that participants who reported having driven more than 40,000 kilometres responded faster to hazards than those reporting less than 10,000 kilometres experience.

A study was conducted by Rosenbloom, Shahar, Elharar, and Domino (2007), to measure the influence an advanced driver training had on drivers' risk perceptions. A total of 224 individuals undertook the training and had their perceptions of particular driving scenarios recorded. The participants were asked to rate the risk levels of the scenarios before and after the training exercises. Interestingly, the training involved the

participants' being exposed to driving situations very similar to the ones they were initially asked to rate. The participants' risk ratings before the training were compared to their risk rating after the training. The researchers found significant differences between the pre and post training perceptions. These findings highlight the importance of experience as it showed that the drivers involved viewed specific driving scenarios as more dangerous once they had gained first-hand experience with the risk involved.

An ordinary everyday driving situation can present a driver with a barrage of decisions, with each decision having to be quickly organised into a hierarchy of priority, based on array of implications. Novice drivers need to dedicate a great deal of mental resources to consciously organise the onslaught of stimuli they are presented with. After gaining experience with ordinary repeated driving scenarios, novice drivers become able to organise information into specific systems. These systems are based on what their brain automatically recognises and thus organises into specific pathways. The more experience a driver has the more automatic and complex these systems of organisation become. Experienced drivers, once automated in their responses, have far more mental resources on hand to dedicate to conscious decision-making (Oppenhiem and Shinar, 2011).

1.4. Speeding with an Attitude

1.4.1. Speed is the number one concern

It is a well-known fact that speed is the main factor in crash occurrence and severity. New Zealand road statistics in 2013 showed that speeding was the main contributing factor in 74 fatal crashes and 1,293 crashes which resulted in injury. Around 50 percent of fatalities and injuries on New Zealand roads are in some way related to speeding (Land Transport Safety Authority, 2000). As a vehicle travels faster, the chance of it crashing increases at an exponential rate. Also, the faster a vehicle is travelling when it crashes, the more damage is done to both the vehicle and the people involved. It is believed by many government transport agencies that people often aren't aware how dangerous speeding can be. Most people think that speeds only slightly over the legal limit are reasonably safe but do not realize just how much more dangerous they can be. A speed just five kilometers per hour over the limit can drastically affect driver reaction time and the distance required in order for a car to stop.

1.4.2. The faster you go the bigger the mess

Speed is an aspect of peoples' driving that has been targeted in order to increase road safety in many countries. New Zealand policy makers have made a number of attempts through advertisement campaigns to influence the speeds at which New Zealanders travel. Many of the advertisements shown on TV have been viewed as highly disturbing, however, graphic and unpleasant content is believed to be necessary in order to raise awareness. Clemenger BBDO executive creative director Phillip Andrew stated that it is important to reach audiences in way which they can relate to when it comes to speeding

advertisements. Andrew helped produce the well-known 2014 television advertisement 'Mistakes' which depicts two drivers freezing in time before a collision and interacting with one another before accepting the crash is inevitable and returning back to their vehicles. The aim of the advertisement was to portray New Zealand roads as social setting which should require the same principles of consideration and respect expected within most other public spaces. Andrew stated "If we get the average speed on New Zealand's roads down from 107 or 108 kilometers per hour down to about 100 kilometers per hour, then the campaign will be regarded as a success. Our job is to save lives" (StopPress, 2016). The main concept behind the campaign was that mistakes are unavoidable, but by reducing our speed we can reduce the damage caused.

Despite the efforts of researchers and government agencies to reduce drivers' speed, there are still a significant number of deaths and injuries on New Zealand's roads each year. The frequency of these events has been decreasing gradually with a significant drop from 2009 to 2014 over holiday periods especially. However, there are still many incidents which can be and could have been avoided by speeds being reduced. Despite the decrease in fatalities and injuries on New Zealand roads in the last decade, there is still an issue regarding driver age and the speeds at which drivers choose to travel (Ministry of Transport, 2010; MacDonald, 1994).

1.4.3. Drivers have a distorted view speeding-risk

It has become extremely apparent that reducing the speeds at which drivers travel can drastically decrease the number of road-related incidents that occur. The New Zealand Ministry of Transport (2010) reported that speeding contributed to over 100 fatal crashes in New Zealand in 2009. Also reported were 361 serious injuries, over 1,200

minor injuries, and 113 deaths. Despite the dangers of speeding being so clear, it is very common for drivers to underestimate the effect of speeding. Most adult drivers make the assumption that moderate speeds exceeding that of the proposed limit are acceptable. In many cases some drivers believe that designated speed limits are purposely set lower than what is safe because policy makers are accounting for a slight increase in expected driver speed.

Young drivers are notorious for underestimating the dangers of exceeding the speed limit, and have been found to be more extreme than older drivers in their underestimation of speeding risk. According to McKenna and Horswill (2006), young drivers tend to be more ignorant to the risks of speeding because they have had fewer negative experiences with which negative consequences have been associated with speeding. Many young drivers have also been found to be more concerned with receiving a speeding fine then with being in an actual speed-related road accident. This is believed to be due to the fact that while most young drivers have had at least some form of experience with a speeding fine, very few have actually been affected directly by an accident where speed was the cause (McKenna and Horswill, 2006).

According to Weinstein (1987), research has often found that most people believe they are more likely to have positive experiences over negative ones. The term for this phenomenon is widely referred to as unrealistic optimism (DeJoy, 1989; McKenna and Horswill, 2006). Unrealistic optimism is common and can have its uses in keeping people positive and motivated; however, when considered in contexts with major consequences such as driving, unrealistic optimism can be very dangerous. Horswill and McKenna (1999) found that when viewing road accident statistics, people have a tendency to put themselves in the safe category and assume that those who end up in the unsafe category

are unlucky. This is dangerous because the reality is that the consequences of road accidents can be devastating and can make any driver their victim in an instant.

Attitudes play an important role in determining drivers behaviour, for example, McKnight and Resnick (1993) suggest that deliberate violation of the speed limit is often motivated by personal reasons such as sensation or thrill seeking, or the need for peer approval. Overconfidence is another everyday risk factor identified in many people. Like unrealistic optimism, overconfidence can greatly affect peoples' attitudes, levels of anxiety, and perceptions on control. The difference between the two, however, is that unrealistic optimism affects peoples' attitudes while overconfidence affects peoples' behaviour directly. Overconfidence has been identified by researchers as the cause of many catastrophes in human history. Countless incidents ranging from simple mechanical failure to the waging of war have been caused by overconfidence (Moore and Healy, 2008). "No problem in judgment and decision making is more prevalent and more potentially catastrophic than overconfidence" (Plous, 1993, p. 217).

Young people have also been found to be very susceptible to sensation seeking behaviours. As stated above, there a number of reasons for this both social and neurological. Sensation seeking is also a characteristic of many adult drivers and has been found to influence the way some people drive. According to Arnett (1994) sensation seekers have lower perceived risk when compared to non-sensation-seeking individuals. Drivers who report high levels of sensation-seeking have been found to travel at faster speeds and take greater risks when overtaking other vehicles and merging into traffic.

1.5. Laboratory Speed Choice Testing

It is clear to see from the reviewed literature that research has brought forward compelling evidence to suggest that driver speed choice is a key contributor to crash involvement. In order for preventative measures to be designed and implemented, researchers and transportation experts must properly understand the psychological processes that underlie drivers speed choice behaviour. While it is well known that individual differences such as attitudes and beliefs are critical components in determining drivers speed choice, there are other varied environmental and contextual factors such as road markings and surface conditions, the time of day, and what type of road drivers encounter which greatly influence speed choice.

Having identified the need for speed to be more closely studied in controlled settings, researchers have spent decades refining different laboratory and simulator based techniques to measure drivers speed behaviour while ensuring that drivers behave as naturally as possible. Ensuring ecological validity is essential for any study, and as such traditionally speed behaviour has been studied through the use of 'naturalistic' roadside observation techniques or through the use of instrumented vehicles. Although these techniques often have high ecological validity, they often lack the control and consistency which is found in laboratory based approaches. Bridging this gap between real-world validity and laboratory control has seen the increased use of simulations to study driving behaviour. Simulators have a long history of use within the transportation research community, allowing researchers to create controlled experiments, as well as expose participants to realistic situations that could be potentially hazardous in real-world scenarios (Horswill and McKenna, 1999). Despite evolved simulators becoming increasingly realistic and close to replicating the actual driving experience, they are

burdened by costly development, installation, and maintenance costs. This has lead researchers to develop innovative and cost-effective laboratory experiments which do not rely on hi-fidelity simulators, such as showing participants recorded video footage of real world driving to investigate their behaviour. This has been utilized successfully in numerous studies to explore different aspects of driving behaviour, such as hazard perception, and speed choice.

1.5.1. The Video Speed Choice Task

Horswill and McKenna (1999) were pioneers of a technique of using video footage to explore drivers speed choice. Video footage had been used since the 1970's to explore drivers speed behaviour (Evans, 1970), and had been found to be effective, there were lingering questions regarding the ecological validity of using video footage, as participants were not able to directly interact with the filmed situations. In order to address these concerns, Horswill and McKenna (1999) conducted a study with a large sample of drivers (651 randomly selected participants) to explore the relationship between chosen speed, and drivers' historical driving behaviour, as well as an array of psychometric and attitudinal measures. Their experimental setup was elegant in its simplicity. A selection of fifteen pre-filmed video clips were taken from footage that had been obtained from a camera mounted to the passenger seat of a car driven around the Berkshire County in England. These clips were selected according to criteria that had been established in order to allow for flexibility in speed choice, and were then reduced to a selection of seven clips based on the ability to differentiate between male and female drivers. These seven clips were then shown to each participant, with the participant being

able to indicate whether they would choose to travel slower or faster than the speed shown in the video in increments of +-10mph.

Horswill and McKenna (1999) asked three basic questions: "(a) Does video speed choice predict previous speed-related accidents? (b) Does video speed predict speed-related accidents even after age, gender, and mileage have been taken into account? and (c) Does the questionnaire speed measure predict speed-related accidents, taking into account age, gender, and mileage?" (pp. 978) They found that participants who chose faster speeds in the video task were more likely to have been involved in a speed-related accident within the past three years, and also more likely to be involved in an accident irrespective of whether speed was a contributing factor.

This demonstrated that not only was use the use of video footage an ecologically valid technique to explore drivers behaviour, but that speeding behaviour might be suggestive of a greater propensity for risk-taking whilst driving in general (as evidenced by the relationship to non-speed related accidents). According to Horswill and Mckenna (1999), the speeds that people choose to drive are the best indicator of how prone they are to general risk taking behaviour. More specifically, peoples speed choice reveals a lot about their risk-taking behind the wheel, as "it [speed choice] has been shown to be one of the most important predictors of road accident involvement" (Horswill and McKenna, 1999, pg. 977).

1.5.2. The Video Speed Task in a New Zealand context

Following on from the initial work conducted by Horswill and McKenna (1999), researchers at the University of Waikato in New Zealand decided to modify the

experiment by Horswill and McKenna for a New Zealand audience. The University of Waikato video task research (Cantwell, Isler, and Starkey, 2012) approached how age and experience influenced speed choice across a range of different road conditions, ranging from multiple-lane motorways through to more hazard dense suburban roads.

This was a new approach, as Horswill and McKenna (1999) had only investigated a single road condition. The study by Cantwell et al., (2012) attempted to conform to the criteria established by Horswill and McKenna in their collection of video footage, so that the results would be comparable. They found that while older and experienced drivers adapted their speed choice to differing road conditions, young novice drivers tended to use the speed limit as a target for their speed selections. For instance, they found that novice drivers would choose similar speeds about that of the road speed limit (100kmh) for both motorway and rural roads, despite the rural roads being much more hazardous at higher speeds than the motorway scenarios. Young and inexperienced drivers tended toward to speed limit of the road in their speed choice on all but the most hazardous suburban road scenario, whereas older and more experienced drivers appeared to adjust their speed choice to be more conservative and in-line with the conditions that presented in each video clip.

Like with the study by Horswill and McKenna (1999), they found that faster speed choices corresponded with a greater number of speeding related offences, as well as greater enjoyment of risk-taking and more lenient attitudes towards dangerous driving behaviour in general, and speeding in particular. Age and experience was also found to be a strong predictor of speed choice, with young drivers choosing faster speeds than older and more experienced drivers, though they were unable to explore the effects of experience or average distance travelled as a confounding variable.

1.6. The Current Study

This research will seek to further investigate the relationship between life, student satisfaction, and self-reported measures of past and intentional future risk-taking (BYNDS, PFDV, and self-reported Skill) using both a video speed-choice task (VST) developed and validated by Horswill and McKenna (1999) and adapted for a New Zealand context by Cantwell, Isler, and Starkey (2012).

1. *Do age and gender of drivers influence their self-rated driving skills and total preferred speed?*

Based on the literature it was expected that younger male drivers would have the higher speed choice in the video speed task, and that younger females would generally be more conservative in their speed choice compared to younger male drivers (Forsyth, 1992). However, the literature is divided on this subject, with some studies suggesting that it is possible that little difference might be observed between younger males and females (for example, Fildes, Rumbold, and Leening, 1991; Harrison, Fitzgerald, Pronk, and Fildes, 1998). It was expected that the younger driver group overall would choose faster speeds, whereas the older driver group in general would have more conservative speed choices (Cantwell, Isler, and Starkey, 2012).

2. *Does impulse control have any effects on preferred speed?*

From the reviewed literature, it is anticipated that individuals with greater emotional control, would be more conscientious drivers, and this would lead to more conservative preferred speed choices.

3. Do drivers' past and future driving violations influence preferred speed?

In the literature, it was found that there was predictive value in both past (BYNDS) and future (PFDV) measures and the likelihood that an individual would be involved in a vehicle crash. One important finding was in the research conducted by Parker, Reason, Manstead and Stradling (1995), which found that intention to commit driving violations was strongly related to the likelihood of driving dangerously or being involved in a crash in the future. In reviewing the literature, it is hypothesized that higher self-reported driving violations and intention to commit driving violations in the future should be related to faster speeds on the Video Speed Task. Additionally, a higher self-rated skill level is expected to be related to faster speeds.

4. Does overall Life Satisfaction affect preferred speed?

Previous research in this area has found that individuals with greater life satisfaction tend toward slower speeds (Taubman Ben-Ari, 2014), and it is expected that this finding will be replicated in the current study using the video based speed choice measures.

2. Method

2.1. Participants

Forty-eight student drivers were recruited from the University of Waikato to participate in this study. The age of participants ranged from 18 to 54 years with a mean age of 36 years and a standard deviation of 25.5. The majority of the participants were Psychology students, some of whom received 1% course credit as an incentive for their participation. Most of the drivers (42), however, were not eligible for the course credit, and received a coffee or chocolate in appreciation for their participation in the study.

2.2. Laboratory Based Measures

2.2.1 Video Speed Task (VST)

The concept of the Video Speed-Choice Task (VST) was developed by Horswill and McKenna (1996) as a validated technique in measuring drivers' speed choice in the laboratory. The VST used in the current study was further developed by Cantwell (2010) to be more suited to a New Zealand driving context, and includes drivers' estimates of how fast they were travelling for different video scenarios. The task begins with 2 practice video clips followed by 28 trial video clips (4 clips were repeated to ensure consistency of responding). Each clip runs for six seconds and depicts a vehicle travelling along either a rural or urban road environment, shown from a driver's perspective.

Participants were asked to watch each of the video clips as if they were the driver of the vehicle. Following the conclusion of each individual video clip, immediately a speedometer is presented (see Figure 2.1) along with the question "How fast do you think you were travelling?" The participant is instructed to "drag the needle" of the

speedometer to indicate the speed at which they believed the car was travelling, and then to click OKAY once they are satisfied with their speed estimate selection. Following participants selecting their estimated speed upon clicking OKAY, another speedometer was displayed with the question "What do you think would be the most appropriate speed for this road condition?" to which the participant is instructed to indicate their answer on the speedometer. Each video clip is separated by a 3 second count down. Clips were presented in a pre-determined randomised order which was identical for all participants, and following the presentation of all 28 clips with corresponding speed estimate and choice selections, the words "Finished, Thank You" appear on a box which, once clicked on, concluded the laboratory based part of the experiment.

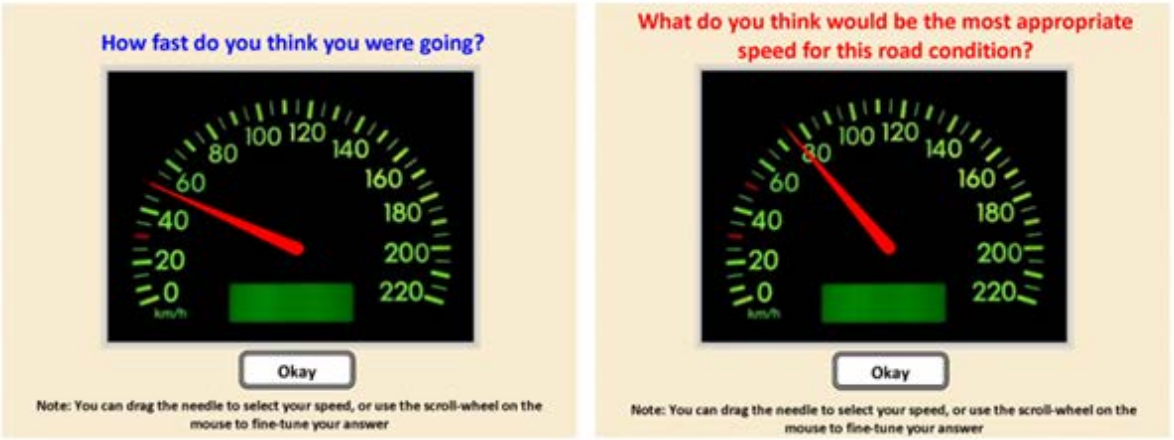

Figure 2.1: Speedometers used to record participants' speed estimation (left) and speed preference (right). Speeds were initially set to 0 km/h prior to responding.

There were 14 rural road scenarios, and 14 urban road scenarios (see Figure 2.2). Half of the rural environments are either wet (7 rainy road situations) while the other half a dry (7 dry road conditions). Likewise, half of the urban road scenarios are recorded at day

time, while the remaining half are night time. Still captures from the video scenarios from each of these road environments are shown in Figure 2.3.

Figure 2.2: Snap shots of videos used in VST depicting urban roads in both day and night conditions.

Figure 2.3: Snap shots of videos used in VST depicting rural roads in both wet and dry conditions.

3.2.2 The dependent measure used for the Video speed task.

For this research, only one measure was used for the Video speed task. The total preferred speed was a composite score of all z-scores of a total of all participants speed choices across all four separate road conditions. By normalising the preferred speeds for each condition and then creating a composite score by adding these together, it was possible to analyse overall speed choice behaviour without needing to contrast different road conditions.

2.3 Questionnaire Based Measures

2.3.1. Demographics

The demographics questionnaire (refer to the Appendix) recorded participants' age, gender, year of study, current driver's license, and the date at which they received their current license. The questionnaire then required participants to report how they rated their own driving skills from one of the following three options; *Below Average*, *Average* or *Above Average*. This measure of self-rated driving skill was used to determine whether drivers should be considered 'well calibrated', in that they perceive their driving ability to be about that of the average driver, or 'poorly calibrated' where drivers are over-confident in their ability and perceive themselves to be more competent and skilled than the average driver. Participants who reported a skill rating of below-average to average were considered well calibrated and drivers who rated their skill above average were considered as poorly calibrated'.

2.3.2. Student Subjective Wellbeing (CSSWQ-15)

The questionnaire used in this study was a modified version of the original *College Student Subjective Wellbeing Questionnaire* (CSSWQ-15) developed by Renshaw and Bolognino (2016). The CSSWQ was developed to record American college students' levels of subjective wellbeing in regards to the specific tertiary institution they attended.

The original questionnaire was refined down to 15 items found to measure student academic efficacy, gratitude towards college, school connectedness, and academic satisfaction. The modified version used in this study was almost identical to the original but was reworded to suit a New Zealand audience. For example, the word 'college'

was changes to 'university' for two of the items, the term 'professors' was changed to 'lecturers' for one item, and 'school' was changed to 'university' for one of the items.

Participants were instructed to indicate their response to each of the 15 statements by selecting one of the five choices; *Strong Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree*. The questionnaire did not include any reverse scaled items.

2.3.3. Full Life Questionnaire

The 18-item Full Life questionnaire developed by Peterson, Park and Seligman (2005) was used to measure participants' different orientations to happiness (refer to the Appendix). The three dimensions focussed on in this questionnaire were *Pleasure, Meaning* and *Engagement,* each represented by a six-item subscale. By measuring these 3 dimensions along with reported levels of Life Satisfaction (LS), Peterson et. al. (2005) were able to determine that each orientation individually predicted LS. Out of the three orientations, *Pleasure* was found to be the least predictive of LS while *Engagement* was the most predictive. They researchers also found that those who scored high on all three dimensions were experiencing a 'full life' and had the highest levels of LS.

Participants were asked to respond to each item by selecting from one of five responses on a Likert scale (1-5); *Strongly Disagree, Disagree, Neither Agree Nor Disagree, Agree,* or *Strongly Agree*. The questionnaire did not include any reverse items. The questionnaire enabled participants to score a minimum of 18 and a maximum of 90.

A measure of Overall Life Satisfaction was obtained by combining the scores for both the Full Life and CSSQW Questionnaires together. Two groups were then formed, with half

the group labelled 'low' with low to medium overall life satisfactions scores, and the other group labelled 'high' with greater scores on both questionnaires.

2.3.4. Impulsivity

The Barrett Impulsivity Scale (BIS-11) was developed by Barrett (1994) for the purpose of measuring individuals' impulse control through self-reported scores. Some alterations to the original version had been made to the one used in this study (refer to the Appendix). Of the 30 items found in the original scale, 28 were used for the current study. Some of the items were rephrased slightly in order to be more clearly interpreted by the selected participant sample.

Participants responded to each item by selecting one of five options from a Likert scale (1-5); *Never, Rarely, Sometimes, Most of the Time, Always*. After accounting for reverse scores the possible scores for each participant would have a potential minimum score of 28 and a potential maximum score of 112. Half of the items were reverse scaled, and these were rescaled during analysis to provide composite measures with higher scores corresponding to higher impulsivity.

2.3.5. Future Violations Measure (PFDV)

The Probability of Future Driving Violations (PFDV) questionnaire is a 20-item survey which measures people's likelihood of committing future traffic violations, which was a shortened version of the Driver Behaviour Questionnaire developed by Reason, Manstead, Stradling, Baxter and Campbell (1990) originally developed to measure drivers' intention to deliberately commit driving violations. The Survey began with the

question “In the future, how often would you expect to do each of the following?” Participants would then respond to each of the items by selecting one of the options from a Likert scale (1-5); *Never, Unlikely, Likely, Highly Likely,* or *Certain*. The survey did not include any sub-scales, meaning that all 20 items were expected to represent to an overall probability for a given participant to commit driver violations in the future.

2.3.6. Past Violations Measure (BYNDS)

The Behaviour of Young Novice Drivers Scale (BYNDS) Was First developed by Scott-Parker et al. (2009) to measure the frequency of risky driving behaviours carried out by young Australian drivers. The original scale involved 44 items which were all found to be valid to an Australian participant sample. The scale consisted of 5 subscales; 13 *Transient Violations,* 10 *Fixed Violations,* 9 *Misjudgements,* 9 *Risky Exposure*, and 3 *Driver Mood* items. As part of a collaborative study, 21 of the items were revised in order to be more suitable for a New Zealand participant sample.

For the purposes of the current study, only 15 items were selected from the ‘New Zealand refined’ version; 9 *Transient,* 3 *Fixed Violations,* and 3 *Driver Mood* items. Participants registered their response to each of the items by selecting one of five options on a Likert scale (1-5); *Never, Rarely, Sometimes, Often,* or *All of the Time.*

2.4. Apparatus

The experiment took place in the Applied Cognitive Research Laboratory located at the University of Waikato, Hamilton, New Zealand. The laboratory setup is shown in Figure 2.4:

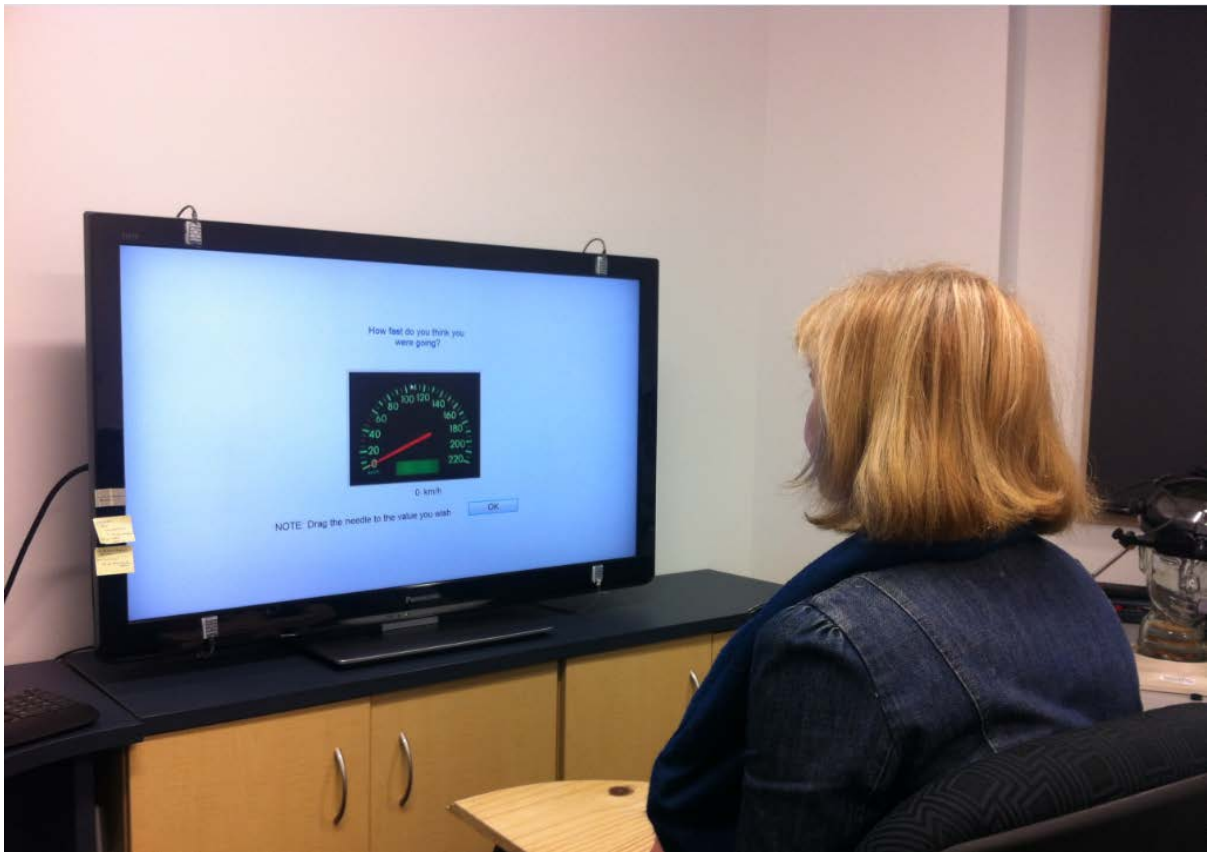

Figure 2.4: The laboratory setup with a participant selecting their preferred speed on the digital speedometer using a wireless mouse.

All participants undertook the experiment in the same room and used the same equipment. The room temperature was kept at 20 degrees Celsius for the comfort of each of the participants. A 45 inch Panasonic television screen was used to display clips from the video speed task (VST) to participants. The distance participants were required to sit from the display in order to obtain the optimal field of view (108 degrees) was calculated

to be 68cm, and this provided the best viewing experience in regards to the television size and the camera perspective used in the video task filming process. Participants were consistently positioned at this fixed distance away from the television screen whilst viewing the video task clips and selecting their responses using a wireless mouse to control the digital speedometer. A separate computer to the side was used for the completion of the online questionnaire measures.

2.5. Procedure

2.5.1 Recruitment

After the study had received ethical approval by the *School of Psychology Ethics Board*, the opportunity for participation was advertised to various students. An advertisement poster (refer to the Appendix) was pinned up at various locations around the University campus, and was emailed to convenors of Psychology papers for which the study could allocate course credit. The poster contained a brief overview of the study's aims and procedure, and provided the researchers contact details for those willing to participate. An information sheet (refer to the Appendix) was sent to any students within the School of Psychology who expressed interest in participating in the experiment.

2.5.2. Data Collection

Participants who agreed to take part in the experiment were each allocated a specific time to meet the researcher either at the TARS laboratory or another location more familiar to them. The participants were ushered into the data collection room and asked to take a seat and get comfortable before being briefed on the experiment procedure. The researcher would then ensure that each participant had read through the *Information Sheet* before instructing them to fill out the two consent forms made available by the University Of Waikato School Of Psychology was modified and used in this study (refer to the Appendix). While the participants were consenting to their participation, the researcher would ensure that all appliances were turned on and ready for data collection.

An adjustable chair was provided for participants during the laboratory testing, and once participants were comfortably seated, the chair was moved to the correct distance from the screen. The calculated distance from the television screen was measured and marked out for the placement of the chair, and a marker on the floor was used to position participants in a consistent manner.

Before undergoing the VST, each participant had the procedure briefly described to them and were assured that, if they were unsure of anything, that the process would make itself clear during the two practice trials. Once the participants had indicated they were ready to begin the process they were asked to do so by clicking the option "Start Video" which led to a three second countdown followed by the first practice trial. During the two practice trials, the researcher explained that there were no inherent correct or incorrect ways of responding to the VST. The researcher also informed each participant that their data would be completely anonymous, and the best data they could provide would be generated by honest responses to the task, in estimating speeds and choosing speeds in the video task. In doing this the researcher was attempting to bypass the participants' potential desire to bias their responding toward a moral or social standard. Once the experiment had begun, the researcher sat at a different location in the lab and was not observing what the participant was doing or the responses that they were providing for the tasks. This would further contribute to the participants' ability to provide accurate data.

Once the VST had finished, the researcher allowed the participants as much time as they needed before beginning the online questionnaire using the adjacent computer. Once the participant had indicated that they were ready to continue, they would be seated in front of a computer monitor displaying the online questionnaire. Participants would

be given a participant identifier which they were instructed to include in the demographic segment of the questionnaire. As with the VST, the researcher explained to the participants that they were not to be identified or judged in anyway based on their responses. The researcher also reiterated the importance of participants providing honest responses to each of the questions. Also, as with the VST process, the researcher made the participants aware that their responding was not being observed.

Once the questionnaire process was complete the researcher thanked the participants and asked them if they had any questions regarding the experiment. Once the participants appeared satisfied with the debriefing process they were once again thanked for their involvement in the study.

2.5.3. Data Analysis

Demographic and questionnaire data were entered onto an Excel spreadsheet. The VST data were automatically recorded onto individual Excel spreadsheets for each participant, which were labelled using the identification number that was used for the questionnaire measures. Values from the video task were paired with the corresponding questionnaire responses, and this data was transferred to an SPSS spreadsheet where subscales, totals, means, and other new variables could be computed. Items which were reversed in the questionnaire form were rescaled where applicable. Once this had been done the necessary items were reversed and each of the questionnaires were organised into sub-scales. The PFDV was computed as a total as there were no sub-scales within it.

Standardized *Z-scores* were then calculated and the data were organized based on the road conditions involved in the task. The VST data initially displayed the means of

participant response regarding both *Estimation* and *Preference* of speed. Speed estimates were not examined in the final analysis. The different variables were run through a series of bivariate correlations. The first of these correlations involved all of the questionnaire data, number of reported incidents and near misses, and VST variables which can be found in the Appendix. Following this, a number of other correlations were observed involving different variables, and based on these observations, several measures were combined (life and student satisfaction variables into a single overall life satisfaction variable). The significant correlations were all recorded and graphs were designed to further investigate these findings.

3. Results

Of the 48 participants who completed the experiment, the data of four participants were not included in the data analysis, either due to missing values, or in order to reduce speed outliers in the variable of total preferred speed. An outlier was defined for participants who either chose unusually low or high total preferred speeds (below or above the mean preferred speed by 1.5 times interquartile mean). The 44 participants were 21 male and 23 female drivers, of which 25 were younger than 25 years (*younger* group), and 19 were 25 years and older (*older* group). The results will be reported in the order of the research questions.

First, correlation matrix of the normalised dependent variables (total preferred speeds, self-rated driving skills, impulse control, frequency of past driving violations, probability of future driving violations, and overall life satisfaction was calculated, and this is presented in the Appendix. As the diagram indicates, there were several correlations that were of significance between the different attitudinal and psychometric measures.

Firstly, the student satisfaction measure was found to correlate strongly with the life satisfaction measure (r=.510), and it was decided that these two measures should be combined to produce a measure of overall life satisfaction that was then used for later analysis. Additionally, both life and student satisfaction were positively correlated with impulsivity subscales of pleasure (r=.322) and non-planning respectively (r=.469)

Self-rated driving skills was found to be significantly positively correlated with both past (r=.424) and future probability of driving violations (r=.528), and the frequency of past driving violations was strongly correlated with the greater likelihood of engaging in future driving violations (r=.540) Both these measures and past and future driving

behaviour were found to be related to the motor and non-planning subscales for impulsivity. However, there was no significant relationship between past and future driving violation measures and measures of life and student satisfaction.

In the analysis, because there were a range of different road conditions, in order to compare preferred speed between different driver groups, the preferred speed for each condition was normalized and then a composite total was produced by adding the resulting z-scores together (total preferred speed). It is noteworthy that the variable total preferred speed was not significantly related to any of the used attitudinal or psychometric measures.

3.1 Do age and gender influence self-rated driving skills and preferred speed?

3.1.1 Effect of age and gender on self-rated driving skill

Initially, the role of driver age and gender on self-rated driving skills (see Method section 3.3) was examined, with Figure 3.1 showing self-rated driving skills grouped by gender and age. An initial inspection of the figure indicated that both age and gender groups provided a self-reported skills rating above that of the average driver.

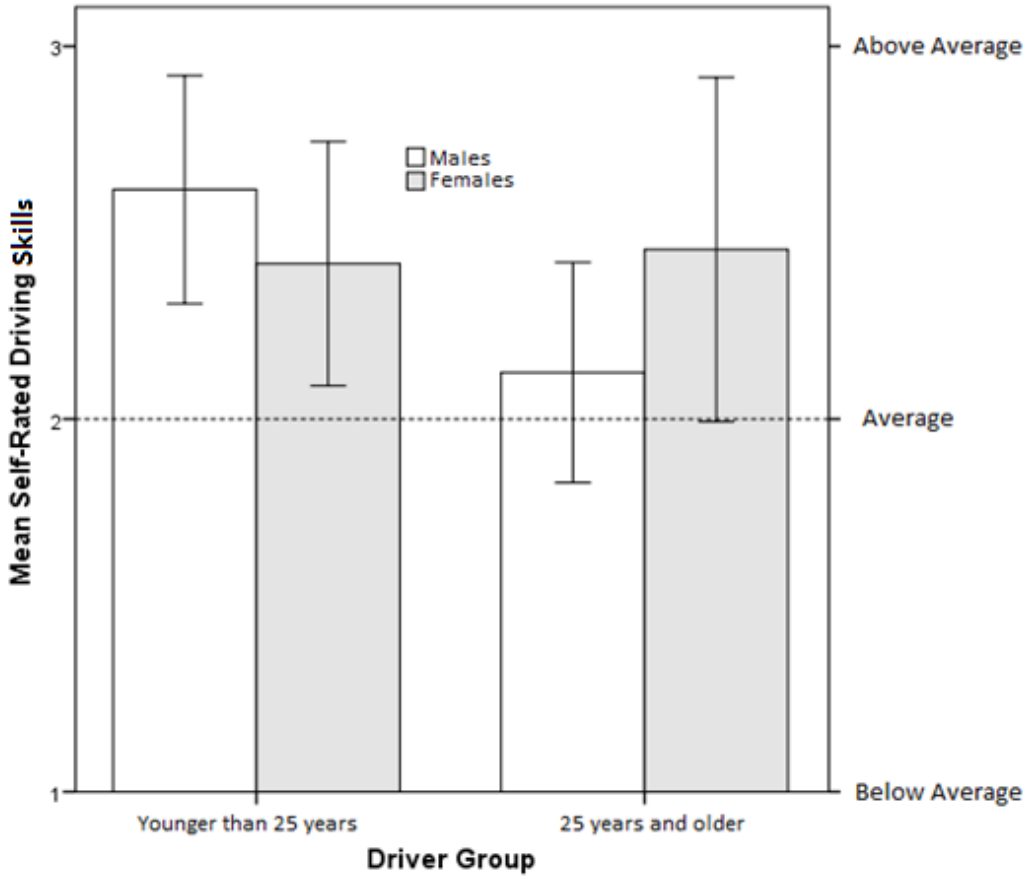

Figure 3.1. Self-reported driving skill shown by age and gender groups. Error Bars represent 95% confidence intervals. The dotted line represents a self-rated skill of the 'average driver'.

It is visually apparent that younger male drivers rated their skills higher than that of older male drivers, while for the female drivers there appears to be little difference between

age groups, with younger female drivers rating their skills only slightly lower than the older female drivers, with descriptive statistics revealing younger females rating themselves with a mean score of 2.42 (SD = 0.51), and older females rating themselves with a mean score of 2.45 (SD = 0.68). Younger male drivers rated their skills the highest out of all groups (M = 2.62, SD = 0.51) while older male drivers rated their skill the lowest out of all driver groups (M = 2.13, SD = 0.34).

A 2 (Gender) x 2 (Driver Age) ANOVA was conducted to examine the effects of the two main factors gender and driver age (and interaction) on self-rated driving skill. Levenes's tests for the equality of variances ($p > 0.05$) suggested that parametric analysis would be a suitable method. The ANOVA indicated no significant main effects (or interactions) on self-rated driving skill (all $p > 0.05$).

3.1.2 The effect of age and gender on total preferred speed

The effects of driver age and gender in their total preferred speed was examined. The role of age was examined, and this is shown in Figure 3.2:

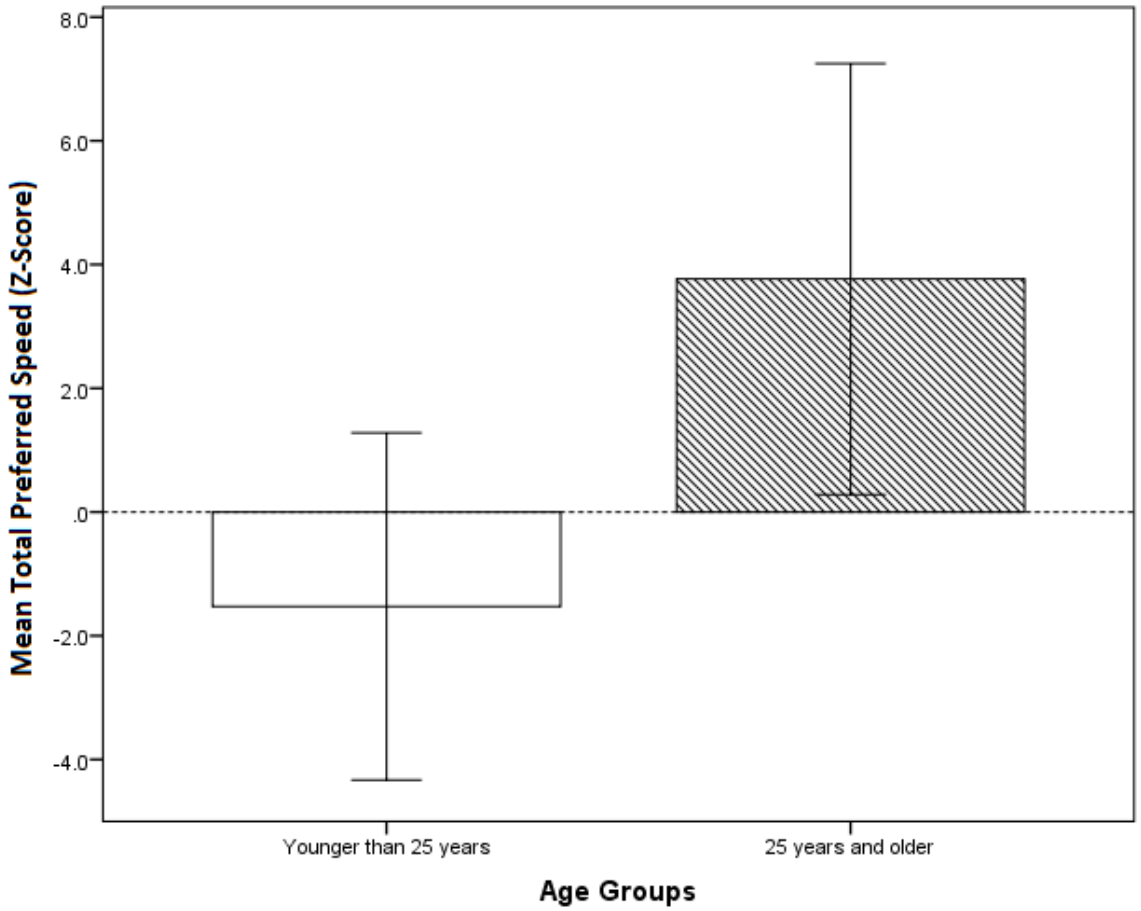

Figure 3.2. Mean z-scores for total preferred speed by driver age groups. . Error Bars represent 95% confidence intervals.

Visual inspection of Figure 3 shows a clear difference between younger and older drivers in relation to their normalised preferred speed. Younger drivers can be clearly seen to choose 'slower' speeds (M = -1.525, SD = 6.79) than older drivers (M = 3.76, SD = 7.01). This clearly observed difference was found to be significantly different in an independent sample t-test, $t(41) = -2.487$, $p < 0.05$. This finding suggests that drivers 25 years and older in our sample have chosen faster speeds than drivers below 265 year.

Gender effects were then examined, and this can be seen in Figure 3.3.

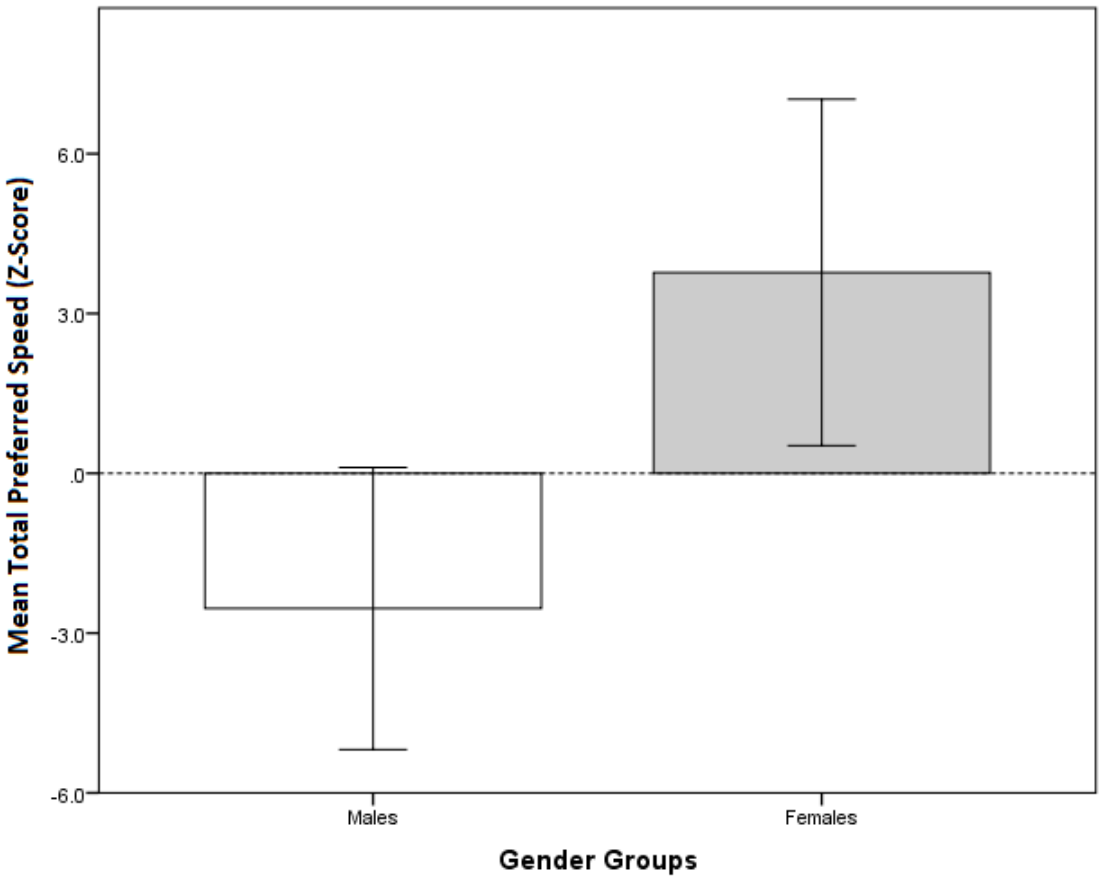

Figure 3.3. Mean z-scores for total preferred speed by Gender. Error Bars represent 95% confidence intervals.

Visual inspection of Figure 3.3 shows a clear difference between male and female drivers in relation to their total preferred speeds (z-scores) over all road conditions (rural, urban, wet and dry). Male drivers seen to have chosen slower preferred speeds choices ($M = -2.53$, $SD = 5.81$) than their female driver counterparts ($M = 3.77$, $SD = 7.33$), and an independent sample t-test confirmed this difference, $t(41) = -3.114$, $p < 0.05$. Overall, this suggests that female drivers are more likely to choose faster preferred speeds than the male drivers in this sample, which was unexpected.

3.1.3 Effect of driver calibration on overall speed choice

Based on the initial observations in relation to drivers self-rated driving skills, drivers were assigned into two groups, with drivers who self-rated their skill as 'average' or below (N = 24, 12 male and 12 female) were defined as 'well calibrated' whereas drivers who self-rated their driving ability to be greater than that of the average driver were defined as 'poorly calibrated' (N = 20, 9 male and 11 female). The effect that drivers' self-rated skill (calibration) had on their preferred speed is demonstrated in Figure 3.4:

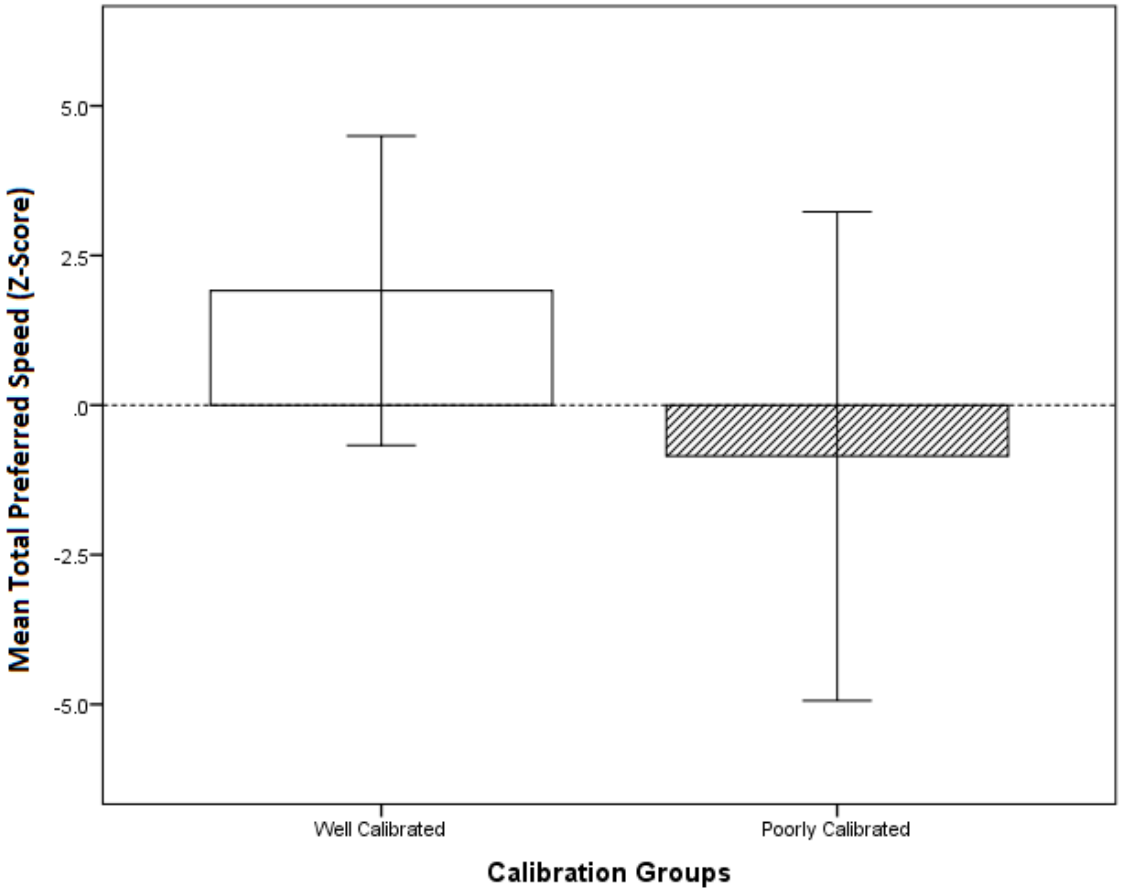

Figure 3.4. Mean z-scores of total preferred speed grouped according to drivers' 'calibration' (self-rated driver skills). Error Bars indicate 95% confidence intervals

Initial visual inspection of Figure 3.4 revealed that drivers who had a more conservative self-appraisal of their driving ability (well calibrated) had 'faster' normalised preferred speeds across all road conditions (M = 1.911, SD = 6.121) than their poorly calibrated counterparts (M = -.853, SD = 8.473), however no significant difference (independent t-test) was found between calibration groups in statistical analysis (p = 0.221).

To explore this finding further, age and gender were analysed as factors along with driver calibration, which are shown in Figures 3.5 and 3.6 respectively.

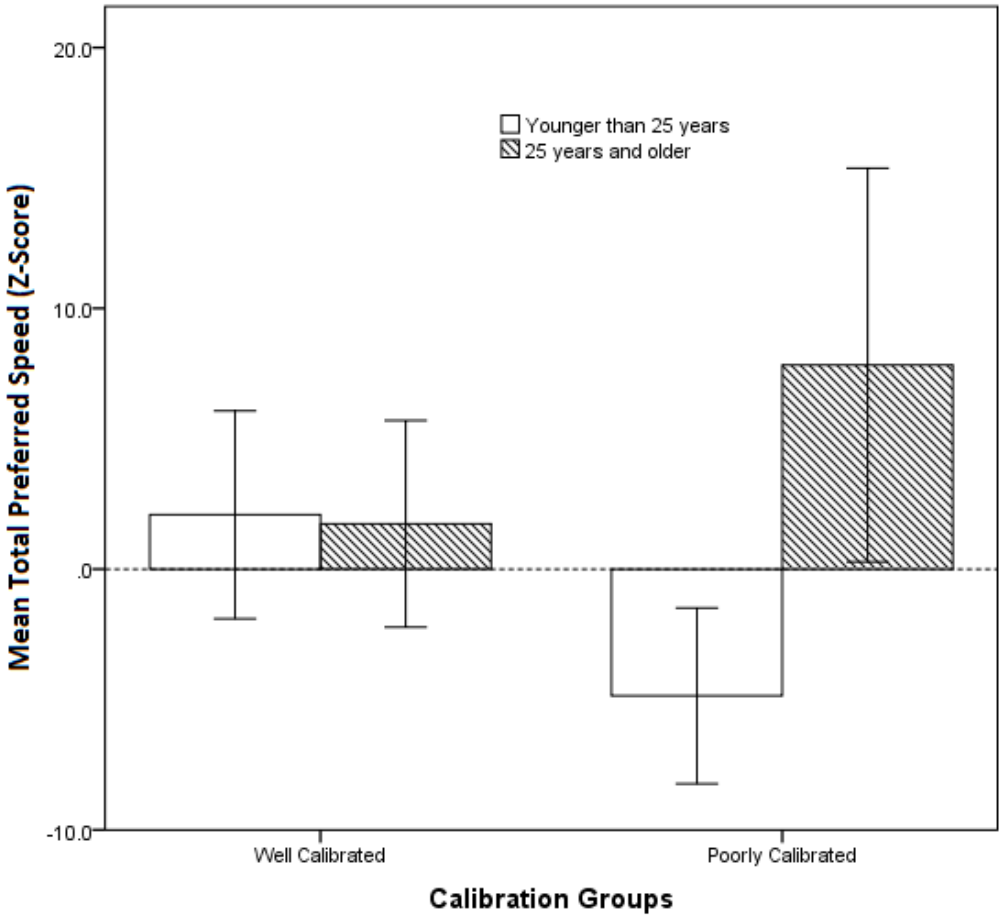

Figure 3.5. Mean normalised preferred speed grouped for younger and older drivers based on their self-rated driving calibration. Bars represent 95% confidence intervals.

Figure 3.5 shows the normalised preferred speed of younger and older drivers grouped according to their self-reported calibration. Visual inspection of the figure shows that there is little difference (between the two age groups for drivers who are well calibrated) have faster preferred speed than poorly calibrated younger drivers who demonstrate slowest normalised preferred speed of all groups (M = -4.85, SD = 5.57). Poorly calibrated older drivers had the fastest normalised speeds choice (M = 7.18, SD = 2.93) of all drivers. Younger well calibrated drivers had a mean normalised preferred speed of 2.08 (SD = 6.27) and older well calibrated drivers had a mean normalised preferred speed of 1.738 (SD = 6.23)

A 2 (Age Group) x 2 (Driver Calibration Group) ANOVA was conducted to explore the interaction between driver age and the calibration measure. Levenes' tests for the equality of variances ($p > 0.05$) suggested that parametric analysis would be a suitable method. The results of the ANOVA revealed a significant interaction for driver age group and driver calibration $F(1,43) = 10.806$, $p = 0.02$ in relation to preferred speed, and a significant effect between driver age groups $F(1,43) = 9.686$, $p = 0.03$.

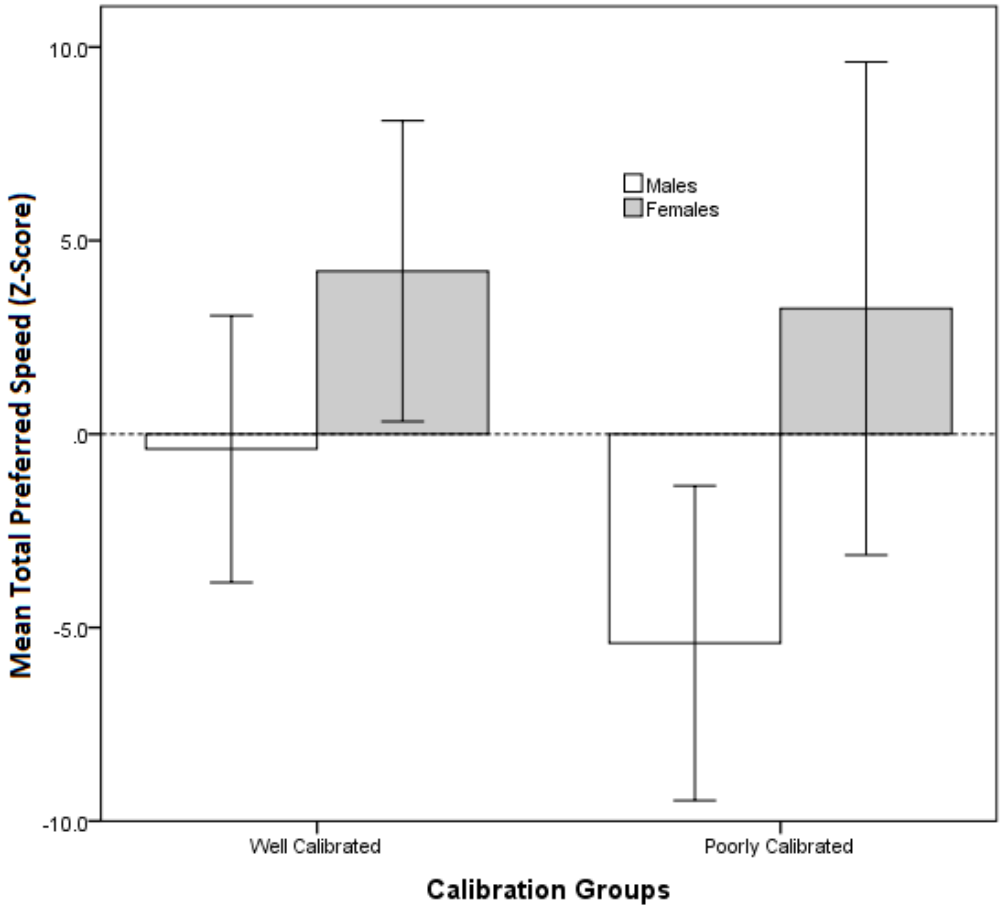

Figure 3.6. Normalised total preferred mean speed scores of male and female students grouped according to driver calibration (self-rated driving skill). Error bars represent 95% confidence intervals.

Figure 3.6 shows the normalised preferred speed of male and female participants grouped according to driver calibration. It can be clearly seen that, overall, female drivers have faster normalised preferred speeds irrespective of driver calibration (M = 3.77, SD = 7.33) than male drivers, who have overall slower normalised preferred speeds (M = -2.53, SD = 5.81). It can also be clearly seen that well calibrated female drivers had significantly faster speeds (M = 4.21, SD = 6.11) than poorly calibrated male drivers (M = -5.40, SD = 1.76).

A 2 (Gender) x 2 (Driver Calibration Group) ANOVA was conducted to explore the interaction between gender group and the calibration measure (low and high self-rated driving skill). Levenes's tests for the equality of variances ($p > 0.05$) suggested that parametric analysis would be a suitable method. The ANOVA indicated no significant main effects (or interactions) on mean total preferred speed (all $p > 0.05$).

3.2. Does impulse control have any effects on preferred speed?

Drivers' levels of self-control in relation to their preferred speeds was then examined. Participants were divided into two groups based on their self-reported impulsivity scores, with the low self-control (N=22, 9 male, and 13 female) group representing those drivers with high (above average) total impulsivity scores, and the high self-control group representing those drivers with low (average and below average) total impulsivity scores (N=22, 12 male and 10 female). This is shown in Figure 3.7:

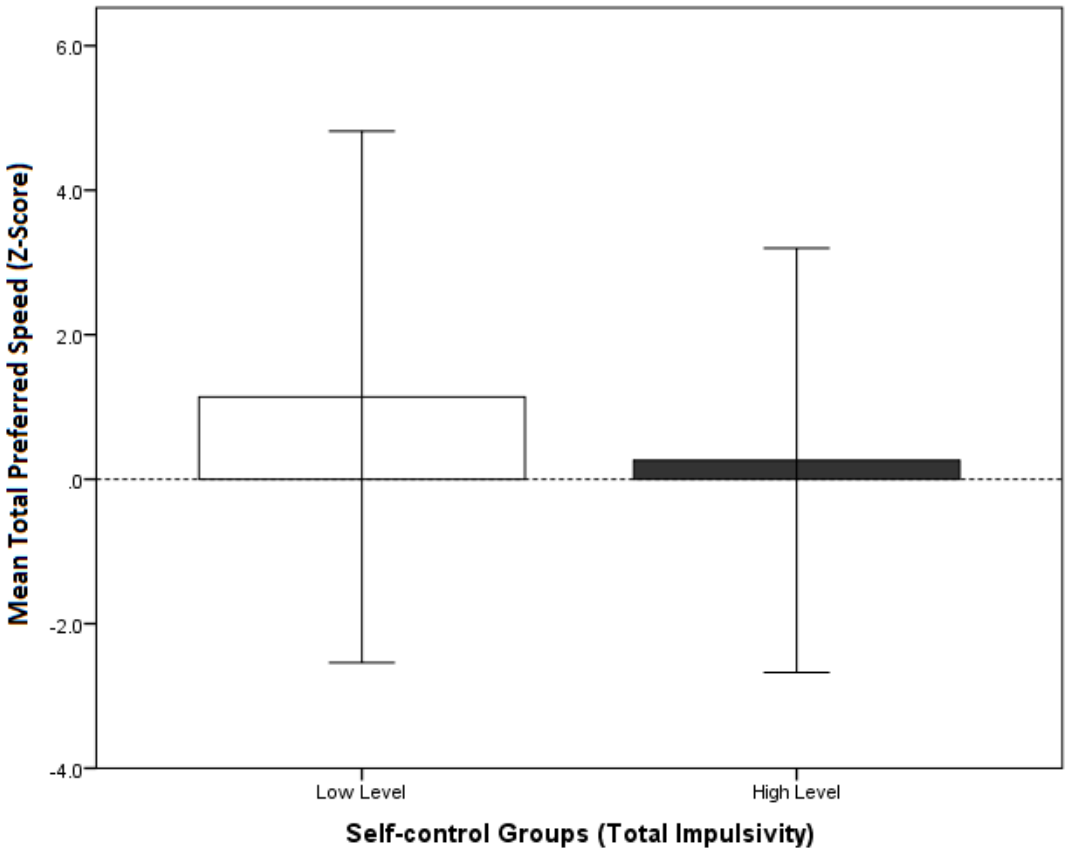

Figure 3.7. Mean normalised preferred speed grouped according to driver's level of self-control (low or high). Error Bars represent 95% confidence intervals.

Visual inspection of the figure indicates that participants with lower self-control group chose faster speeds (M = 1.138, SD = 8.08) than participants with higher self-control (M = 0.262, SD = 6.62). However, an analysis using an independent samples t-test revealed that there was no significant difference ($p<0.5$) between the two self-control groups regarding their normalised total preferred speed on the video tasks.

3.3. Do drivers' past and future driving violations influence preferred speed?

Drivers were assigned into one of two groups based on their self-reported past driving violations (BYNDS), with those reporting a below average score of past driving violations assigned to the low frequency of violations group (N = 22, 10 males and 12 females), and those with an above average past violations score were assigned to the high frequency driving violations group (N = 22, 11 males and 11 females). The mean normalised preferred speed for both groups is represented in Figure 3.8:

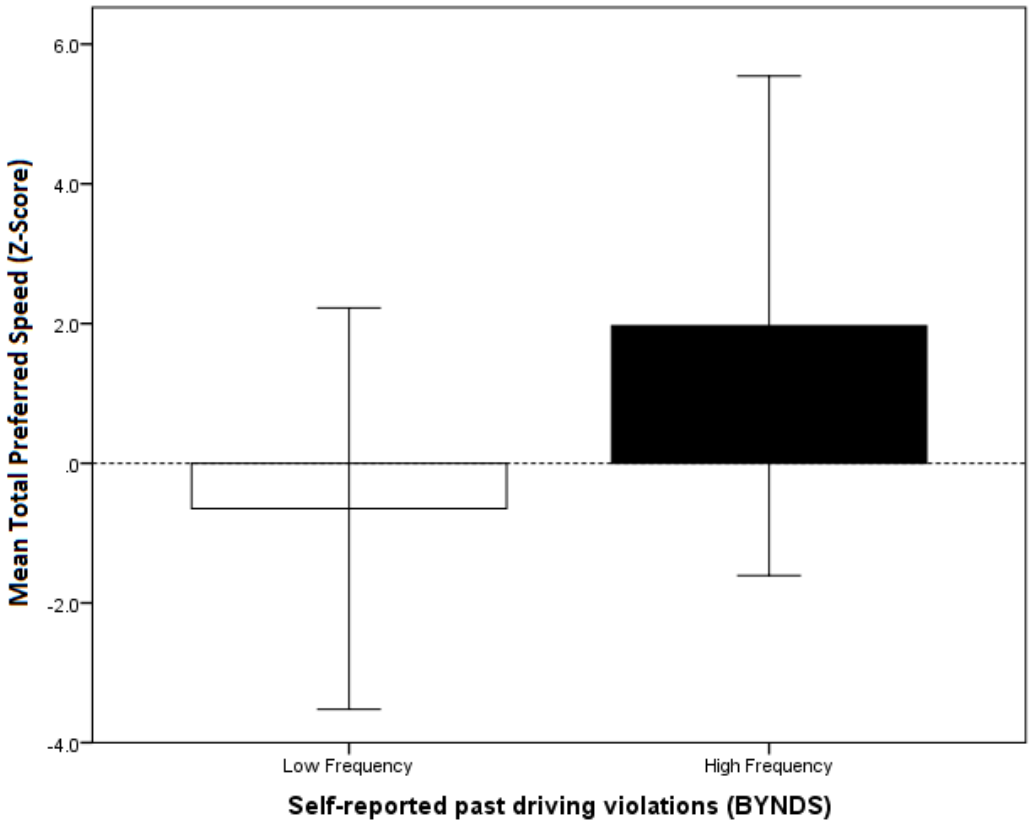

Figure 3.8. Mean normalised preferred speed grouped according to drivers' frequency of past driving violations (low or high). Error Bars represent 95% confidence intervals.

Visual inspection of the figure indicates that drivers reporting low frequency of past driving violations chose lower speeds (M = -0.65, SD = 6.31) than drivers who reported

high levels of past violations (M = 1.96, SD = 8.06). An Independent samples t-test revealed no significant difference between the two violations groups for preferred speed. The likelihood that a driver would engage in future driving violations was measured using the probability of future driving violations scale. Participants were assigned to one of two groups, representing either a high or low probability of intentionally violating traffic regulations. Drivers were assigned to either a low probability of future driving violation (N = 22, 9 males and 13 females), or a high probability of future driving violation (N = 22, 12 males and 10 females), and their normalised preferred speed behaviour is represented in Figure 3.9.

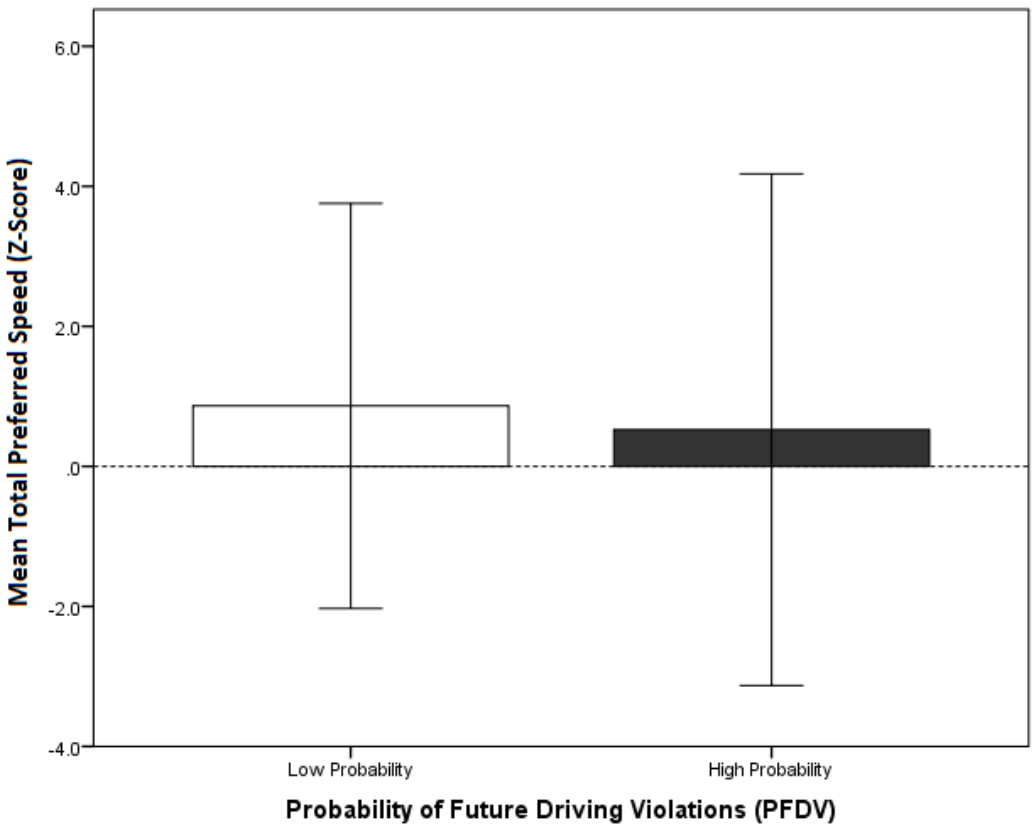

Figure 3.9. Mean normalised preferred speed grouped according to drivers overall self-reported level of self-control (low or high) Bars represent 95% confidence intervals.

Figure 3.9 compares students' self-reported likelihood to commit future driving violations with their normalised preferred speed on the video task. Visual inspection of the figure indicates that there is very little difference between both groups' preferred speed on the video task, with the low probability group having a mean of 0.864 (SD = 6.35) and the high probability group having a mean normalised preferred speed of 0.524 (SD = 8.24). The figure also shows that the low probability group chose slightly slower overall preferred speeds than the high probability group. An independent samples t-test revealed no significant differences between groups in mean normalised preferred speed.

3.4. Does Overall Life Satisfaction affect preferred speed?

As student and life satisfaction measures were significantly highly correlated (r=.523), it was considered that a single composite measure (overall life satisfaction) would provide a good indication of overall life and student satisfaction, and that this could be of predictive value in determining preferred speed.

The Student and Life Satisfaction measures were combined into a single composite measure, and participants were assigned to one of two groups representing drivers with either low (below average) or high (average or above average) self-reported overall satisfaction with life and study.

The two groups representing below average life satisfaction (Low, N=22, 11 males and 11 females) and average or above average life satisfaction (High, N=22, 10 males and 12 females) were then compared for their preferred speed behaviour, which is shown in Figure 3.10.

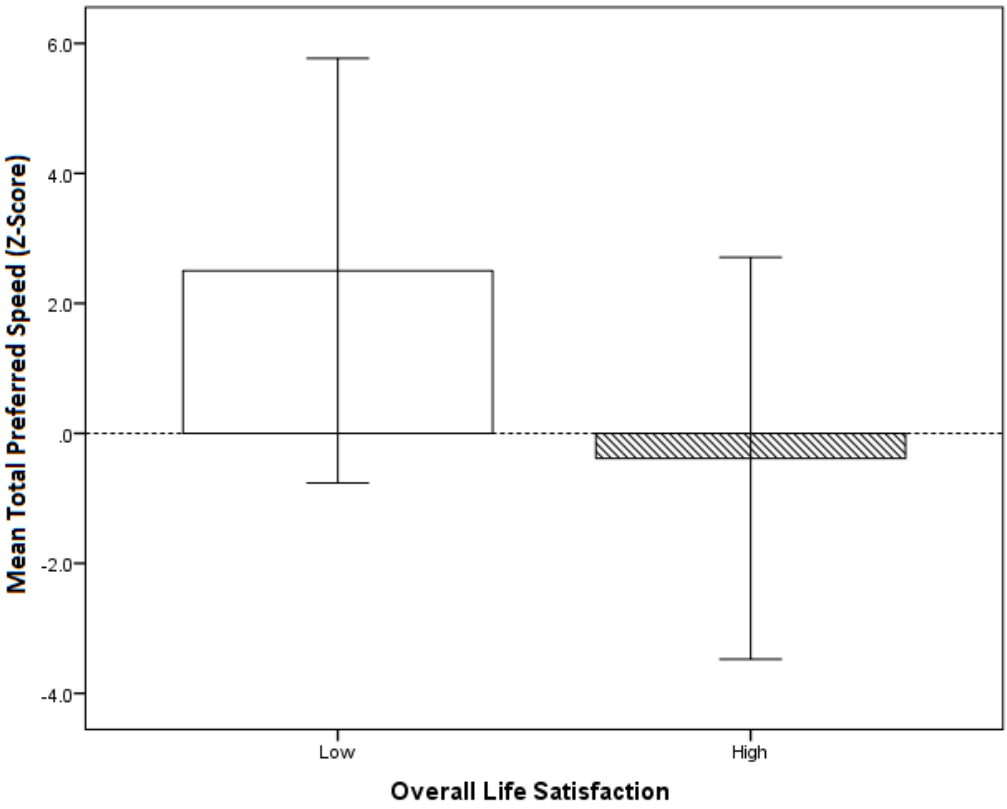

Figure 3.10. Mean normalised preferred speed grouped according to drivers overall self-reported level of life and student satisfaction (low or high). Bars represent 95% confidence intervals.

Visual inspection of the below figure indicates that drivers with low overall life satisfaction chose faster preferred speeds (M = 2.503, SD = 6.12) than those drivers who reported high levels of overall life satisfaction (M = -.384, SD = 7.81) for normalised preferred speed. An Independent samples t-test revealed that there was no significant difference t(43)=1.263, p = .214 between the two life satisfaction groups in their mean preferred speeds.

4. Discussion

In the review of the literature, it was clearly established that young, male drivers who overestimate their driving skills are at serious risk of crashing (for instance, see MacDonald, 1994; Janke et al., 2003; Rajanlin, 1994). This thesis tried to establish whether these drivers will choose faster speeds in the laboratory compared to older, female drivers who are less at risk to crash. Secondly, it examined if drivers' past and future driving violations influenced preferred speed. In previous research, the intention of drivers to commit driver violations was found to be a strong predictor of crashes. Finally, the thesis explored the effect of life satisfaction on speed choice. Recent research found that drivers who experience a high level of life satisfaction reported on a smaller number of incidents (fines, near misses and crashes) than drivers who reported less life satisfaction (Isler and Newman, 2016). The results of the present research will be discussed in the order of the research questions:

4.1 Discussion of Key Research Findings

4.1.1. Do age and gender influence self-rated driving skills and preferred speed?

From the review of the literature, it was anticipated that age, as well as gender, would play a significant role in predicting drivers' self-rated skills and risky attitudes toward driving (for example, Scott-Parker, Watson, and King, 2009; Reason et al., 1990). It was also expected that this would also be reflected in laboratory measures of speed choice, with young and inexperienced males being at particular predisposition towards risky driving behaviour (MacDonald, 1994; Williamson, 2003; Parker, Stradling, and Manstead, 1996). It was found in this experiment that young males indeed rated their driving ability as being above that of the average driver providing the highest self-ratings across age and gender groups. Although this finding was consistent with the reviewed literature (Matthews and Moran, 1986), it was also found that young females rated their driving skills to be above average.

Furthermore, above average rating of driving skills was found to be the case for older and more experienced females, whereas the older experienced males were more inclined to provide conservative ratings of own driving abilities (Ulleberg and Rundmo, 2003). This was an unexpected finding, as it was anticipated that both older drivers groups would have more conservative appreciation of their abilities. It may be that this is more in line with the findings by Fildes et al., (1991) and Harrison et al., (1998), who both reported that male drivers were not significantly more likely than female drivers to be observed travelling at higher speeds. What is noteworthy is that on average, all drivers rated their ability to be above that of the average driver. This was observed in the study conducted by Horswill, Waylen, and Tolfield (2004), who found that most drivers rate their own driving skills as superior to the average driver. Our finding could suggest that

the sample used in this study was 'poorly calibrated' in general and as a whole were overly confident in their driving ability.

In this study, a laboratory based video speed task was used to measure drivers speed choice. This laboratory measure was used in conjunction a questionnaire composed of psychometric and attitudinal measures related to lifestyle satisfaction and risky past and future driving behaviour. From a review of the literature, it is considered likely that higher ratings of skills will correspond to faster preferred speeds in the laboratory measures in particular (MacDonald, 1994; Parker, Stradling, and Manstead, 1996), and more lenient attitudes towards speeding in general. In prior research conducted by Cantwell, Isler, and Starkey (2012), it was found that speed choice in a laboratory-based video speed task was related to both more relaxed attitudes towards dangerous driving behaviour, as well as age, and self-reported driving skill being a strong factor in differentiating faster drivers (young and inexperienced) from slower more conservative drivers (older and more experienced). In the current study, the findings of the earlier study by Cantwell et al., (2012) were not replicated, in that the outcome of video speed choice task in this experiment did not allow the same differentiation between age and experience.

In the video speed task, drivers who rated their skill being average or below chose slightly faster speeds than those drivers who considered their skills to be above that of the average driver. Cantwell et al., (2012) only considered age and experience in their analysis, so when gender was also taken into consideration the findings in the current study were quite unexpected. Male drivers who considered their driving ability to be above that of the average driver had the most conservative speeds in the video task,

whereas female drivers chose the highest speeds irrespective of whether they considered themselves above or below average in their driving skill.

Surprisingly, young males were the most conservative in their speed choice, whereas older females had significantly faster speed choice in the video task measure. From the review of the relevant literature, these findings seem to be in opposition to the major consensus that young novice (inexperienced) males are the most likely to engage in excessive speeding behaviour (Forsyth, 1992; Mayhew, Simpson, and Pak, 2003; Horswill and McKenna, 2006). There are several reasons why this unexpected finding was observed in the current study. Firstly, there is the possibility that younger drivers are more susceptible to bias, so that their preferred speeds reflect perceived expectations of what the experimenter, peers, and society deem to be appropriate. This could have encouraged younger drivers to indicate slower speeds than they would actually drive, so as not to appear risky. Secondly, the older female drivers rated their own driving skills as above average, and when coupled with a greater range and quantity of driving experience, preferred speed could have been faster for adverse conditions used in the video task (wet road, night-time driving) which would contribute to faster overall preferred speeds, without these necessarily exceeding the road speed limit, or being inappropriate for the road conditions. Young drivers tend to have limited night time driving experience (MacDonald, 1994a), and may have selected slower speeds on these conditions. Despite older drivers demonstrating faster overall preferred speeds, considering that the data was normalized means that these speed choices may not have been inappropriate for the road conditions.

A similar pattern was also observed in relation to self-reported skill across the two age and experience groups. It was expected that young drivers who rated their skill average

or below average would provide slower speed choices, however, this is in strong contrast to the findings of the video speed task, as the most conservative speed choices were for those drivers who considered their ability to be above that of the average driver. Across the two age groups the pattern of responding was reasonably consistent for those drivers who rated their ability at or below that of the average driver, with there being no significant differences between the two age groups. However, the older drivers who considered themselves to have skills greater than that of the average driver selected the fastest speed choices. These older drivers who were considered poorly calibrated and over-confident preferred faster speeds which is in keeping with the literature. However, it was anticipated from the review of the literature that young drivers would be more inclined to choose faster speeds (Cantwell, Isler, and Starkey, 2012; Mayhew, Ferguson, Desmond, and Simpson, 2003) as well as rate their driving ability to be higher than the average (Gregerson and Berg, 1994; Parker, Stradling, and Manstead, 1996). Similar to the reasons provided for the unusual findings when preferred speed was examined in relation to gender, the lack of faster speeds for the younger driver group might be owing to bias, or possibly slower preferred speeds on the adverse road condition (wet and night time driving).

4.1.2. Does impulse control have any effects on preferred speed?

In this study, participants were sorted according to their self-reported impulsivity scores into two groups representing those drivers with high (above average) and low (average and below average) levels of impulsive tendency. These two groups were then used to examine if impulsivity was able to effectively predict the speed choice behaviour. As was anticipated from the review of the literature, those with low-level impulsivity (higher self-control) scores selected the slower speeds (Chamorro, Bernardi, Potenza, Grant, Marsh, and Wang, 2012), whereas those with high-levels of impulsivity (low self-control scores) selected speeds that were greater, however, this relationship was not statistically significant for the video-based task. This naturally may be an issue of statistical power, as the sample size was relatively small for the relatively large variability in the data. Irrespective, the trend in the data supports the findings of previous research that higher levels of impulsivity are associated with faster speeds and more lenient attitudes towards speeding in general (Chamorro, et al., 2012; Gregerson and Berg, 1994).

4.1.3. Do drivers' past and future driving violations influence preferred speed?

Although vehicle crashes are a relatively uncommon phenomenon, previous research suggests that a history of vehicle crashes, near misses, and traffic fines or convictions is predictive of the likelihood of being involved in a future crash (Janke, Masten, McKenzie, Gebers, and Kelsey, 2003), and has been associated with more aggressive or reckless driving behaviour, lenient attitudes towards dangerous driving, as well as the tendency to speed (Horswill and McKenna, 2006; Rajanlin, 1994). In this study, the probability of future driving violations and the frequency of past driving violations were used to assign

the drivers into two groups, representing either allow or high frequency of past driving violations.

It was found that a high frequency of historical driving violations was associated with faster speed choice. Statistical analysis revealed that speed choice in the video speed task was not significantly different between low and high frequency violation groups. In the study conducted by Cantwell, Isler and Starkey (2012), it was found that there was a significant predictive relationship between speeds on the video speed task and the number of past traffic violations in the preceding year – a finding which was not replicated in the current study. However, as the difference of the preferred speeds between the two groups did approach significance, and given the relative infrequency of traffic violations and crashes, a larger sample may have revealed the relationship that was observed in their previous study.

4.1.4. Does Overall Life Satisfaction affect preferred speed?

A composite score of the student and life satisfaction measures were used in this study as a proxy measure for overall life satisfaction based on the finding that the two measures were closely related. The literature suggests that job and life satisfaction are closely associated, and it is logical to make the leap to student satisfaction being closely related to general life satisfaction and psychosocial wellbeing. As Isler and Newland (2014) recently showed, there is a relationship between general psychosocial wellbeing and safe and conscientious driving behaviour. In their study, Isler and Newland investigated the role of life satisfaction in predicting self-reported dangerous driving behaviour, and found that low life satisfaction was related to more incidents of dangerous driving behaviour. As noted in the literature review, there is strong link between overall life

satisfaction, job satisfaction, and student satisfaction (Judge and Locke, 1993; Renshaw and Bolognino, 2004; Peterson, Park, and Saligman, 2005).

In the present study, two groups were formed representing drivers who had low to average overall life satisfaction, and those who had an above average overall life satisfaction, and these two groups were then used to examine if there were different speed behaviours in the video task. It was found that those drivers with low overall life satisfaction ratings chose faster speeds in the video based task; whereas, those with greater student satisfaction selected slower speeds in the video based task.

Despite this finding, no statistically significant differences in preferred speeds between low and high overall life satisfaction groups being found in inferential testing, however, the relationship was approaching significance, and with greater statistical power an effect may be more clearly identified. The variability within the sample was quite high, and future testing with a larger or more sensitive measure may produce findings in keeping with that of the previous research by Isler and Newland (2014).

It is worth noting that the pleasure dimension of the life-satisfaction measure was related to the non-planning and attention subscales in the impulsivity measure. This finding might partially explain why individuals with low life-satisfaction had higher speeds, as the pleasure dimension may be related to impulsivity and sensation-seeking, while meaning and engagement may have the opposite role in reducing risky driving behaviour. It is possible that impulsivity is the mediating variable in the relationship between life-style measures and risky driving measures, but this requires further investigation.

4.2. Limitations of the current study

The current study was conducted within a New Zealand context using a range of different road conditions. The sample was recruited from the Waikato University student body, and thus may not necessarily represent the general population. Despite the fact that students are often recruited as participants, they are a unique population and may not have the same psychometric characteristics when compared to members of the general population (for instance, students often need to delay gratification and develop self-control).

In this study, it was found that both gender groups of young drivers, as well as the older female drivers viewed their driving skill as above average, with the older male drivers being the most conservative in their self-reported skill. In light of this finding, it could be possible that this sample may be overconfident in their driving ability, or underappreciate the ability of the 'average driver' which may create a bias in the sample. While it is difficult to establish how strongly this potential overconfidence may have influenced the findings of this study, a larger and more diversified sample using different sampling strategies and populations in future research may help to reduce the likelihood of encountering a biased sample.

This process of normalizing the speed preference for each different condition does allow for the creation of a composite score which can be investigated as a single measure, however this can also remove some of the important distinctive factors related to these road condition which may increase variability in preferred speeds. It needs to be taken into consideration that when data is normalised, this in essence 'removes the units' and allows for comparison across the different road conditions. Without the units, it is hard

to observe how faster preferred speeds correspond to the road speed limits, and whether they might be inappropriate for the given road condition.

Using the preferred speed data, and analysing each road condition separately may very well indicate that while older female drivers chose the fastest speeds, this neither may be excessive (faster than the road speed limit) or inappropriate for the conditions. For example, in previous research it was found that young drivers chose speeds close to the road limit on all but the suburban situation, which in this study was the main urban scenario (Cantwell, Isler, and Starkey, 2012). It may be beneficial to analyse each road situation separately, so that the differences in speed choice between varied conditions does not inflate variability or dilute observed effects.

4.3. Future Research Directions

The video speed task devised by Horswill and McKenna (1999) and further developed by Cantwell (2010) for a New Zealand context has demonstrated both ecological validity and the ability to differentiate between the speed choice of novice and experienced drivers, and also between drivers with high-risk driving attitudes. The potential future applications for using a video speed task would seem to be innumerable, as footage can easily be collected and used to explore a range of different driving behaviours.

One major finding was that life satisfaction approached statistical significance in being predictive of speed choice, with those with high life satisfaction choosing slower speeds. This finding, although requiring further investigation, may open a new avenue in addressing dangerous driving behaviours through the use of positive psychology and mindfulness training, as opposed to traditional methods of training basic vehicle handling skills or hazard perception. Understand the relationship between overall meaning and purpose, and how to encourage drivers to engage more in positive life experience may prove to be a useful direction for future driver training initiatives.

5. References

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TARS
Traffic and Road Safety Research Group

Speed Choice and Driving Attitudes

We are looking for participants to take part in a study to investigate peoples' attitudes and decisions when driving.

What does the study involve?

- You will need to be enrolled in either PSYC208-15B, PSYC229-15B or PSYC317-15B.
- You will need to have had some experience driving
- You will be volunteering to take part in a research experiment which will run approx. 30-40 mins. During this time you will be asked to complete a questionnaire made up of 7 small components. Afterwards you will be asked to complete a Speed Choice Task on a computer. The task will require you to observe a number of driving situations and guess the speeds being travelled.
- You will get a chance to wear the University's new Eye-Tracker during the Speed Choice Task.
- You will also receive 1% course credit as a thank you for participating in our research.

Who can I contact?

To volunteer as a participant for this experiment or to find out more please Email/Text Dom:

Email: dominicozs1990@gmail.com Mobile: 021 0284 9553

This is a Masters Research project being supervised by Associate professor Robert Isler and Associate Professor John Perrone. Ethics approval has being received by the School of Psychology Ethics Committee. All information gathered in this experiment will be kept completely confidential.

Please take 1

Speed & Driving Attitudes dominicozs1990@gmail.com
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Speed Choice and Driving Attitudes

Information Sheet

The purpose of this study is to investigate the relationship between students' attitudes and decision making in regards to driving speed.

During this experiment participants are asked to:

1) Answer a set of questions about their driving experiences and attitudes, and general happiness and well-being.

2) Complete a Speed Choice Task on a computer. The task will involve observing driving situations and indication both how fast the car was travelling, and how fast it could have been travelling.

3) While carrying out the Speed Choice Task participants will also be asked to wear an eye-tracker to record where they are looking.

4) If at any stage of the procedure you feel as though you no longer wish to continue, you may do so without any penalty.

5) You will be offered 1% course credit towards one of either PSYC208-15B, PSYC229-15B or PSYC317-15B as a thank you for your participation. The procedure should only take 30-40 minutes.

Information provided at any stage of the procedure will be kept completely confidential. If you have any questions during the experiment please do not hesitate to ask. The study has received Ethics approval from the School of Psychology Ethics Committee.

If you have any further questions or would like to participate please contact me:
Email: dominicozs1990@gmail.com
Mobile: 02102849553

School of Psychology

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

CONSENT FORM

Research Project: Speed Choice and Driving Attitudes

Please complete the following checklist. Tick (✓) the appropriate box for each point.	**YES**	**NO**
I have read the Participant Information Sheet (or it has been read to me) and I understand it.		
I have been given sufficient time to consider whether or not to participate in this study		
I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet		
I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without penalty		
I have the right to decline to participate in any part of the research activity		
I know who to contact if I have any questions about the study in general.		
I understand that my participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study.		
I wish to receive a copy of the findings		

Declaration by participant:
I agree to participate in this research project and I understand that I may withdraw at any time. If I have any concerns about this project, I may contact the convenor of the Psychology Research and Ethics Committee (Dr James McEwan, Tel: 07 838 4466 ext 8295, email: jmcewan@waikato.ac.nz)

Participant's name (Please print): _____

Signature: _____ Date: _____

Declaration by member of research team:
I have given a verbal explanation of the research project to the participant, and have answered the participant's questions about it. I believe that the participant understands the study and has given informed consent to participate.

Researcher's name (Please print): _____

Signature: _____ Date: _____

Instructions
Please provide the following information by entering your response in the appropriate place

1. Are you male or female? _____

2. What is your current age? _____ years

3. What type of driver's license do you currently hold?

☐ No license
☐ Leaner (for car)
☐ Restricted (for car)
☐ Full (for car)

4. On what date did you obtain this driving license? _____/_____
Month Year

5. Approximately how many kilometers do you drive in a usual week? _____ km

6. In the last twelve months, how many accidents have you been involved in?
An *accident* is any collision that occurred *on the public roads* (but not private property), **while you were the driver of the vehicle** and **irrespective of who was at fault.**

_____ accidents

7. In the last twelve months, how many near misses have you experienced?
A *near miss* is when you narrowly avoided being in an accident *on public roads*, **while you were the driver of the vehicle** and **irrespective of who was at fault**.

_____ near misses

8 How many traffic fines did you receive in the last 12 months?

_____ fines

9. How would you rate your driving skills

☐ Below average
☐ Average
☐ Above average

Turn over

Instructions

Please assign a number from the following scale to each of the statements below. It is important that you answer each statement honestly. Your responses will be kept completely confidential. No legal or other penalties will incur as a result of your responses.

Please answer the following questions according to the scale:

1	**2**	**3**	**4**	**5**
Never	**Occasionally**	**Sometimes**	**Usually**	**All the time**

1. You sped on purpose when over taking _____
2. You went 10-20 km/h over the speed limit _____
3. You sped up when the lights went orange _____
4. You drove faster when you were in a bad mood _____
5. You drove through an intersection on a red light _____
6. You drove when you thought you might be over the legal alcohol limit _____
7. You overtook a car on the left-hand side _____
8. You raced out of an intersection when the light went green _____
9. Your driving was affected by negative emotions like anger or frustration _____
10. You drove over the speed limit in areas where it was unlikely there would be a speed camera or police officer with a radar _____
11. You drove after taking an illegal drug such as marijuana or ecstasy _____
12. You went over 20 km/h over the speed limit _____
13. You allowed the way you drove to be influenced by what mood you were in _____
14. While driving, you spoke with a mobile that you held in your hands _____
15. You drove on the right-hand lane on the motorway when not overtaking _____

Instructions

Every driver makes occasional mistakes. Even the best drivers make errors or bend the rules sometimes. For each of the statements below indicate how likely you are to engage in this type of behaviour in the future. If you would never engage in the mentioned behaviour, **circle 0**. If you think you will carry out that behaviour with certainty, **circle 4**. Use the remaining numbers to indicate the varying likelihood of you carrying out that behaviour.

In the future, how often would you expect to do each of the following?

Never -0 Unlikely -1 Likely -2 Highly Likely -3 Certain -4

1.	Speed over the legal limit	0	1	2	3	4
2.	Compete in unofficial races with other drivers	0	1	2	3	4
3.	Cut off other drivers	0	1	2	3	4
4.	Drive under the influence of drugs or alcohol	0	1	2	3	4
5.	Overtake another vehicle with limited visibility	0	1	2	3	4
6.	Follow another vehicle too close	0	1	2	3	4
7.	Use the wrong lane at a roundabout or use inappropriate signals	0	1	2	3	4
8.	Fail to stop at a stop and/or give way sign	0	1	2	3	4
9.	Run a red light	0	1	2	3	4
10.	Park in a disabled or expecting mothers car park, of which you are not legally entitled to	0	1	2	3	4
11.	Fail to stop for the police, or fail to stop after an accident	0	1	2	3	4
12.	Drive a vehicle you know has defects and may be unsafe to you or other road users	0	1	2	3	4
13.	Drive a vehicle with uncertified modifications	0	1	2	3	4
14.	Drive without wearing a seatbelt	0	1	2	3	4
15.	Be angry about a bad driver	0	1	2	3	4
16.	Drive whilst disqualified or drive outside of your license restrictions	0	1	2	3	4
17.	Drive without a Warrant of Fitness or without a registration	0	1	2	3	4
18.	Use your hands to talk on a cell phone or text	0	1	2	3	4
19.	Drive using only one hand or your knees to steer the vehicle	0	1	2	3	4
20.	Deliberately violate a road rule	0	1	2	3	4

Instructions

We all think differently in day to day situations. Please read each statement and circle the answer that best describes the way you act and think. Do not spend too much time on any one statement. Answer quickly and honestly.

Rarely/Never	**Occasionally**	**Often**	**Almost Always/Always**
1	**2**	**3**	**4**

1.	I plan task carefully	1	2	3	4
2.	I do things without thinking	1	2	3	4
3.	I am happy-go-lucky	1	2	3	4
4.	My thoughts race	1	2	3	4
5.	I plan trips well ahead of time	1	2	3	4
6.	I am self-controlled	1	2	3	4
7.	I concentrate easily	1	2	3	4
8.	I save regularly	1	2	3	4
9.	I find it hard to sit still for long periods of time	1	2	3	4
10.	I am a careful thinker	1	2	3	4
11.	I say things without thinking	1	2	3	4
12.	I like to think about complex problems	1	2	3	4
13.	I change jobs	1	2	3	4
14.	I act on impulse	1	2	3	4
15.	I get easily bored when solving through problems	1	2	3	4
16.	I have regular medical/dental check ups	1	2	3	4
17.	I act on the spur of the moment	1	2	3	4
18.	I am a steady thinker	1	2	3	4
19.	I buy things on impulse	1	2	3	4
20.	I finish what I start	1	2	3	4
21.	I walk and move fast	1	2	3	4
22.	I solve problems by trial and error	1	2	3	4
23.	I spend or charge more than I earn	1	2	3	4
24.	I talk fast	1	2	3	4
25.	I have outside thoughts when thinking	1	2	3	4
26.	I am more interested in the present than the future	1	2	3	4
27.	I am restless in class/groups	1	2	3	4
28.	I plan for the future	1	2	3	4

Instructions

Everyone's experience of University is different. Please assign a number from the following scale to each of the statements below. Please answer quickly and honestly. Try to respond with the first answer that comes to mind.

Please answer the following questions according to the scale:

1	2	3	4	5
Strongly disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

1. I am a hard worker in my classes _____
2. I am thankful that I am getting a tertiary education _____
3. I am an organized and effective student _____
4. So far I have had a great experience at the University of Waikato _____
5. People at this University are friendly to me _____
6. I am satisfied with my academic achievement since coming to the University of Waikato _____
7. I feel thankful for the opportunity to learn so many new things _____
8. I am happy with how I am doing in my classes _____
9. Other students at the University of Waikato like me the way I am _____
10. I am grateful for the people who have helped me succeed at University _____
11. I study well for my classes _____
12. I feel like a part of the University of Waikato _____
13. I am grateful for the lecturers and other students who have helped me in class _____
14. I am a diligent student _____
15. I can really be myself at the University _____

BYNDS

-Transient Violations

- You drove over the speed limit in areas where it was unlikely there would be a speed camera or police officer with a radar.
- You sped on purpose when over taking.
- You went 10-20 km/h over the speed limit.
- You went over 20 km/h over the speed limit.
- You drove on the right-hand lane on the motorway when not overtaking.
- You sped up when the lights went orange.
- You overtook a car on the left-hand side.
- While driving, you spoke with a mobile that you held in your hands.
- You drove after taking an illegal drug such as marijuana or ecstasy.
- You raced out of an intersection when the light went green.

-Fixed Violations

- You drove through an intersection on a red light.
- You drove when you thought you might be over the legal alcohol limit.

-Driver Mood

- Your driving was affected by negative emotions like anger or frustration.
- You allowed the way you drove to be influenced by what mood you were in.
- You drove faster when you were in a bad mood.

*No reversed questions. 1-5

Good Life Survey

-Engagement

- Regardless of what I am doing, time passes quickly.
- Whether at work or play, I am usually "in a zone" and not conscious of myself.
- I am always very absorbed in what I do.
- I am rarely distracted by what is going on around me.
- In choosing what to do I always take into account whether I can lose myself in it.
- I seek out situations that challenge my skills and abilities.

-Meaning

- My life serves a higher purpose.
- I have a responsibility to make the world a better place.
- I have spent a lot of time thinking about what life means and how I fit into its big picture.
- My life has a lasting meaning.
- What I do matters to society.
- In choosing what to do I always take into account whether it will benefit other people.

-Pleasure

- Life is too short to postpone the pleasure it can provide.
- I love to do things that excite my senses.
- I go out of my way to feel euphoric.
- For me, the good life is the pleasurable life.
- In choosing what I do, I always take into account whether it will be pleasurable.
- I agree with this statement "Life is too short, ear dessert first".

*No reverse scores. 1-5

CSSWQ-15

-Satisfaction with Academics Scale

- I am happy with how I am doing in my classes.
- I am satisfied with my academic achievement since coming to the University of Waikato.
-

-Academic Grit Scale

- I am a hard worker in my classes.
- I am a diligent student.
- New Ideas and projects never distract me from my schoolwork.

-School Connectedness Scale

- I feel like a part of the University of Waikato.
- People at this University are friendly to me.
- I can really be myself at the University.
- Other students at the University of Waikato like me the way I am.

-Academic Self-Efficacy Scale

- I am an organized and effective student.
- I study well for my classes.

-College Gratitude Scale

- I am thankful that I am getting a tertiary education.
- I am grateful for the lecturers and other students who have helped me in class.
- I feel thankful for the opportunity to learn so many new things.
- I am grateful for the people who have helped me succeed at University.

*No reversed scores. 1-5

B.I.S

-Attentional

- My thoughts race.
- I concentrate easily.
- I find it hard to sit still for long periods of time.
- I am restless in class/groups.
- I finish what I start.

-Motor

- I do things without thinking.
- I change jobs often.
- I act on the spur of the moment.
- I buy things on impulse.
- I spend or charge more than I earn.

-Non-planning

- I plan task carefully, and well ahead of time.
- I am self-controlled.
- I save regularly.
- I say things without thinking
- I like to think about complex problems.
- I get easily bored when solving through problems.
- I am more interested in the present than the future.
- I solve problems by trial and error.

Red items = Reversed. 1-5

Relationship between Questionnaire Measures

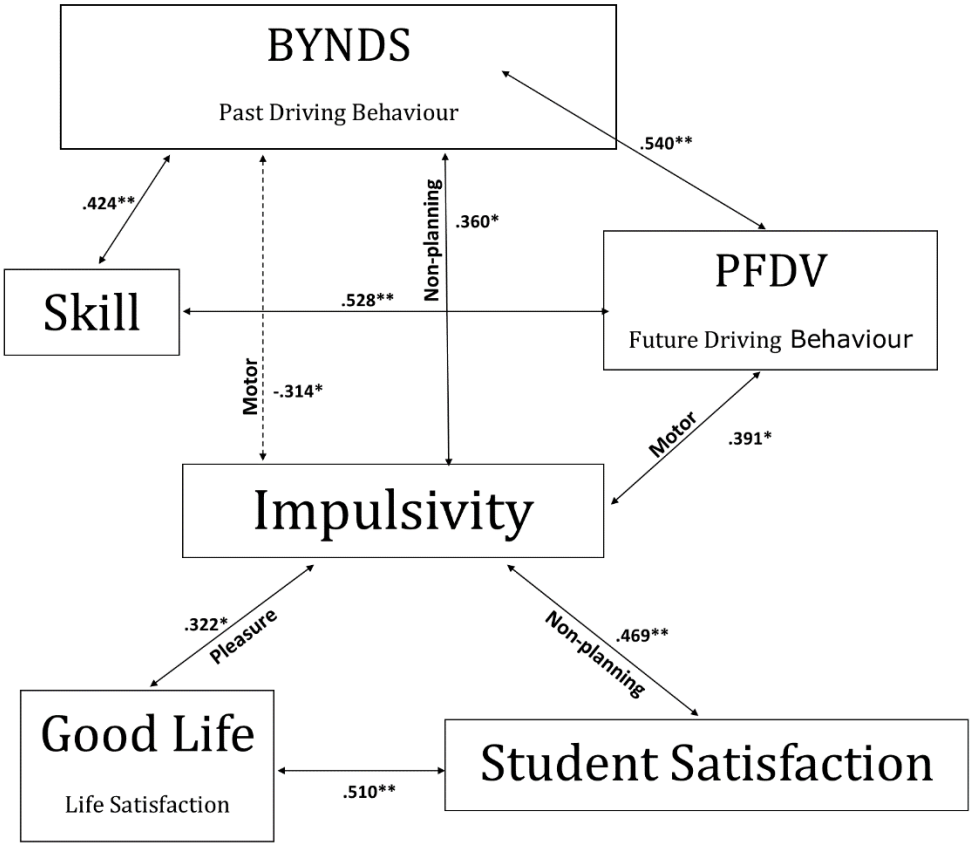

Figure: The above figure shows the relationship between self-reported psychometric total scores and related subscales. The strength and direction of the correlation is shown in the text.